MOTOROLA

SERVICE MONITOR

MODEL S1327B

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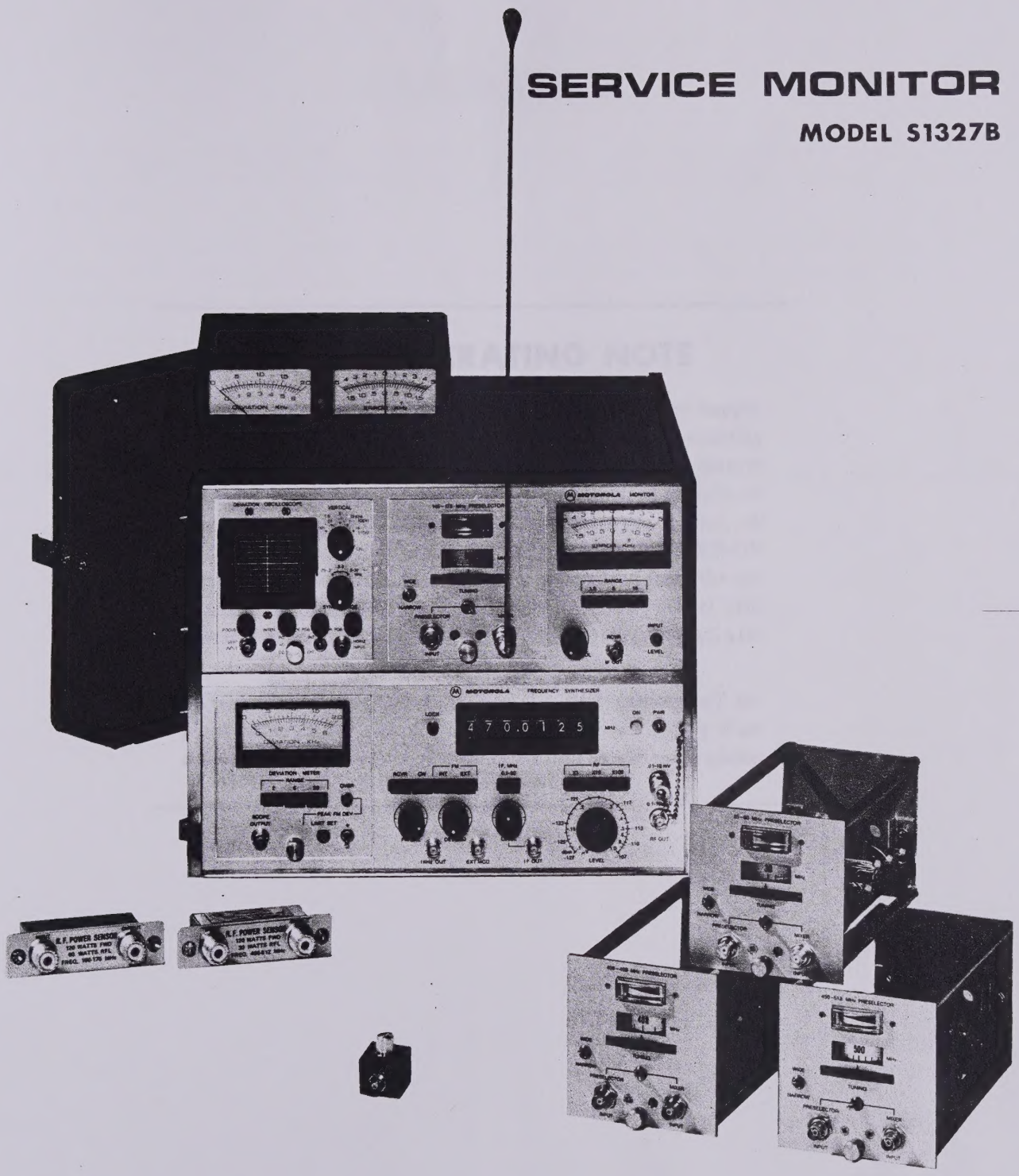

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Communications Division Parts Dept.
1313 E. Algonquin Rd., Schaumburg, Ill. 60172

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SPECIAL OPERATING NOTE

The Service Monitor incorporates a special A9 Power Supply Regulator which offers protection from accidental shorting of a supply while working on the instrument. This feature operates by detecting a sudden transition toward ground on any of the regulated supply outputs. When this occurs, *all four supplies shut off.* However, the front panel POWER-ON lamp (white) will remain on, as this is powered from the unregulated supplies. TO RESTORE OPERATION, TURN THE FRONT PANEL POWER SWITCH OFF; THEN, ON AGAIN.

NOTE: Insertion of plug-ins without first turning off the front panel Power switch will often cause power supply shutdown. When this occurs, restore operation as indicated above.

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FOREWORD

If any damage to the shipping container is apparent upon receipt, the delivering driver should be requested to note such damage on all copies of the freight bill. This is for your protection should the material inside be damaged.

The equipment should be unpacked immediately, examined for damage, and tested. If it fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. The claim should be filed within forty-eight hours after receipt, if possible, or during a period not to exceed fifteen days.

A full report of such damage should be obtained from the claim investigator, who will call upon you. For the purpose of this report, the shipping container and all packing materials should be retained for the investigator to examine.

The investigator's report should then be forwarded to:

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Include model number and serial number when referring to the instrument for any reason.

Arrangements for repair or replacement will be made and you will be advised of the disposition of the instrument.

Warranty

Motorola instrument equipment, other than tubes and fuses, is warranted by Motorola for a period of one year after delivery to the original purchaser, against defects in design, material and workmanship. Our liability under this warranty is limited to servicing or adjusting any instrument returned to the address indicated herein for that purpose, and to replace any defective parts thereof.

This warranty is in lieu of all other warranties, expressed or implied, and all other obligations or liabilities on Motorola's part.

Readout tubes carry their own 90-day manufacturer's warranty.

This warranty is effective for one year after delivery to the original purchaser, when the instrument is returned, transportation charges prepaid, by the original purchaser, and when upon our examination it is disclosed to our satisfaction to be defective. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at the net price of necessary parts and a service charge at the manufacturer's then prevailing labor rates. In this case, an estimate will be submitted before the work is started.

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CHAPTER 1
GENERAL INFORMATION

1.1 INTRODUCTION

The Model S1327B Service Monitor is a solid-state test instrument designed to provide a frequency-synthesized signal source and a receiver for precision high-resolution deviation and frequency measurements over the entire 20 MHz to 990 MHz spectrum.

1.2 STANDARD FEATURES

Simplicity of operation, reliability, and easy maintenance highlight the features of the S1327B. The circuitry is completely solid-state and mounted on modularized printed-circuit assemblies.

The Synthesizer portion of the unit (lower half) generates "drift free" signals with 100 Hz resolution. Frequency coverage is continuous from 1 MHz to 990 MHz with all outputs on fundamentals. Frequency modulation of the output is provided, either with the internal 1 kHz source or an external source such as "Private Line" or other tone equipment. Internal and external modulations may be used simultaneously. The internal 1 kHz source is available on the front panel for many uses, including modulation of a transmitter while setting the deviation.

The Synthesizer output is adjustable with a three-position pushbutton multiplier and a variable attenuator. A maximum output of 10,000 microvolts is available for adjusting severely detuned receivers. Both Synthesizer outputs are fused for protection against input overloads. An IF mode is also available with frequency coverage of 100 kHz to 90 MHz and maximum output levels of at least 1 V rms below 10 MHz, and 0.25 V rms above 10 MHz. This output is also "drift free" and has 100 Hz resolution.

The Synthesizer normally operates with an internal 1 MHz reference oscillator. A rear-panel BNC connector (1 MHz INT/EXT) provides a 1 MHz reference when the associated toggle switch is set to INT. If it is desired to use an external reference, the 1 MHz INT/EXT switch is set to EXT and the reference is applied to the BNC connector.

The Monitor portion of the unit (top half) is a broadband receiver which uses the "drift free" output of the Synthesizer as its local oscillator. With the broadband mixer plug-in installed, the receiver covers 20 MHz to 990 MHz. A high-linearity discriminator operates the illuminated front-panel error meter. A level lamp indicates the presence of sufficient signal to operate the receiver. A built-in audio amplifier and speaker provide an aural indication of any modulation on the received signal. A RCVR IF OUTput permits measuring the exact frequency error of the received signal with a frequency counter.

Two plug-in modules may be used in the Monitor and one in the Synthesizer, permitting simultaneous analog (meter) and visual (oscilloscope) display of deviation. The broadband mixer plug-in in the Monitor may be replaced with one of several preselector plug-ins to give added sensitivity and selectivity. Each preselector also has a wideband input similar to the broadband mixer plug-in.

1.3 OPTIONAL FEATURES

The Service Monitor may be equipped with a higher stability, temperature-controlled, "instant on", crystal oscillator. This option is normally factory installed but may also be installed in the field if necessary.

An optional dc inverter is also available to permit the Service Monitor to operate from the 12 V electrical system of a vehicle. This option is designed for field installation, or it may be factory installed.

1.4 SPECIFICATIONS

RF Signal Generation	Range:	1 MHz to 990 MHz, fundamental Operation.
	Output Level:	0.1 µV to 10 mV nominal into 50 Ω.
	Amplitude Accuracy:	±2 dB 1 MHz to 590 MHz; ±5 dB 590 MHz to 990 MHz. Measured at 0.5 µV.
	Resolution:	100 Hz.
	Readout:	7-digit thumbwheels.
	Frequency Accuracy:	Related to reference oscillator used.
		Standard oscillator 1 X 10^{-7} parts per week aging rate.
		High stability option (Type X) 3 X 10^{-9} per day.
IF Signal Generation	Range:	100 kHz to 90 MHz, fundamental operation.
	Output Level:	At least 1 V (adjustable) 100 kHz to 10 MHz; 0.25 V (adjustable) 10 MHz to 90 MHz (into 50 Ω).

IF Signal Generation (Cont'd)

	Resolution:	100 Hz.
	Frequency Accuracy:	Same as RF mode.
FM Mode	Internal Modulation:	1 kHz (1000 Hz) modulation frequency. Variable to 20 kHz deviation. Also available on front-panel BNC jack.
	1 kHz Frequency Accuracy:	Related to master oscillator.
	External Modulation:	DC to 20 kHz frequency range. Panel control for varying deviation to 20 kHz.
Frequency Measurement	Range:	20 MHz to 990 MHz with Model SLN6352A broadband unit; 25 to 50 MHz, 145 to 175 MHz, 406 to 420 MHz, and 450 to 512 MHz with optional preselector plug-ins.
	Sensitivity:	With broadband unit, better than 1 mV from 20 MHz to 590 MHz; better than 5 mV from 590 MHz to 990 MHz. With each preselector plug-in, better than 20 µV in preselector mode; better than 10 mV in mixer mode.
	Readout:	Zero-center meter, 1.5, 5, and 15 kHz ranges.
Deviation Measurement	Deviation Readout:	Meter (Plug-in Model SLN-6350A). Oscilloscope (Plug-in Model SLN6351A) optional.
	<u>Meter Model SLN6350A</u>	
	Range:	0 to 2, 6, 20 kHz.
	Accuracy:	±4% of full scale.

Meter Model SLN6350A (Cont'd)

Indicator:	Meter (analog) with peak deviation light, preset control, and oscilloscope output BNC jack.

Oscilloscope Model SLN6351A (Optional)

Range:	±1.5, ±5, and ±15 kHz full scale deviation. .01, .1, 1, 10, 100 V p-p full scale.
Frequency Response:	20 kHz. (External Input)
Accuracy:	±5%.
External Vertical Sensitivity:	10 mV p-p for full scale.
Inputs:	External vertical - 1 MΩ. External horizontal - 1 MΩ.

General

Temperature:	Operating, -12°C to +55°C. Storage, -55°C to +85°C.
Power Source:	115/230 V ±10%, 50 to 400 Hz. Optional inverter 12 V dc.
Dimensions:	(Less feet) 10 1/2" High X 14" Wide X 15 1/8" Deep.
Weight:	Less than 40 lbs.

CHAPTER 2
INSTALLATION

2.1 INTRODUCTION

This chapter presents procedures for inspection and initial installation of the Model S1327B Service Monitor. Reshipment instructions have been included should it become necessary to return the instrument for service or repair.

2.2 RECEIVING INSPECTION

Before accepting the instrument from the shipper, inspect the instrument shipping container for signs of external shipping damage. Any sign of such damage must be noted by both the shipper and customer, and should be reported to the insurance investigator.

As soon as the instrument is unpacked, inspect it for shipping damage. Check for scratches or dents, broken or cracked knobs, and damaged connectors. Should any damage be found, notify your nearest Motorola representative -- do not use the instrument until instructed to do so by the representative.

2.3 COOLING

The Model S1327B does not require forced air cooling. Installation, however, should be such as to allow normal circulation around the instrument, especially the rear panel.

2.4 POWER CONNECTION

Either 115 V or 230 V ac may be used to power the Service Monitor. A slide switch, mounted on the rear panel, is used to select the voltage setting.

NOTE

For 115 V ac operation use 1.5 A SB fuse. For 230 V ac operation use .75 A SB fuse.

A standard three-conductor power cord is supplied which automatically grounds the unit when a matching power receptacle is available. An adapter which provides an instrument ground should be used whenever the power cord must be connected to a two-conductor outlet.

2.5 INITIAL TURN-ON

This procedure will test the Service Monitor for any major internal shipping damage. Successful completion of these tests should precede use of the instrument.

a) Be certain power line matches the unit, then connect power cord to an outlet. Set the rear-panel INT/EXT 1 MHz switch to INT.

b) Turn on power switch. The ON lamp should be energized as well as the meter lights (if switched on).

c) Select CW mode. INPUT LEVEL light should be out.

d) Select INT FM mode. Set frequency within operating range, preferably select a frequency which can be monitored on a radio receiver. LOCK lamp and INPUT LEVEL lamp should light.

e) Adjust FM CAL to center error meter (15 kHz RANGE), and adjust DEV ADJ knob (black knob) for 4 kHz on Deviation Meter or Oscilloscope.

f) At this point, if a suitable radio receiver is available, connect the antenna to the .01 - 10 mV RF BNC output. Push on X 100 RF button; turn RF LEVEL knob full clockwise and verify that an output signal is present.

2.6 PREPARATION FOR RESHIPMENT

Should it become necessary to reship the instrument, contact the nearest Motorola field office for shipping instructions. If possible, use the original packaging materials or replace in accordance with MIL-P-116 and MIL-E-17555E. The field office can provide materials similar to those used for original factory packaging. All correspondence should refer to the full nomenclature and serial number of the instrument involved.

CHAPTER 3
OPERATION

3.1 INTRODUCTION

The Model S1327B Service Monitor is designed to produce the signals and indications required to test FM radio equipment. A frequency-synthesized generator for drift-free operation and a broadband receiver are the basic components.

The following sections describe the basic operation of each mode and note some of the possible sources of error when making measurements.

3.2 OPERATION OF THE SYNTHESIZER

3.2.1 Lock Indicator

A panel lamp (green) is provided to indicate that the Synthesizer is operating properly. Should the lamp blink on and off, or fail to light, check for improper operation or circuit malfunction. For example, setting a frequency over 99.9999 MHz in the IF mode will turn off the lamp.

3.2.2 RF Output Amplitude Controls

Two different output connectors, internally fuse-protected, provide two ranges of RF output voltage when in either CW or FM mode. The low-level output provides calibrated signals in the 0.1 to 100 μV range. The high-level output provides calibrated signals in the .01 to 10 mV range. A three-position pushbutton switch provides multiplying factors of 1, 10, and 100 to the calibration marked on the RF level control when using the low-level output. On the dBm scale, add 0, 20, or 40 dB corresponding to the X1, X10, and X100 positions. When using the high-level output, multiply by an additional factor of 100 (add 40 dB).

NOTE

When using the low-level output, the high-level output connector must be terminated with the attached 50 Ω load.

To replace output fuses, simply remove the bottom cover of the instrument to gain access to the two fuse holders located behind the output connectors. Replace with Little Fuse Micro 1/10 A, or equivalent. A spare fuse is located near the fuse holders.

3.2.3 CW Mode

Depressing the CW button causes the Synthesizer to produce a signal whose frequency is selected by the seven thumbwheel switches. Any frequency from 1.0000 MHz to 989.9999 MHz may be generated.

3.2.4 FM Mode

The INT and EXT FM buttons are used, either individually or together, to produce a signal which is modulated by an internal 1 kHz signal, an external DC to 20 kHz signal, or a combination of both internal and external signals. As in the CW mode, the carrier frequency is set by the thumbwheel switches. When the INT FM button is depressed, an internally generated 1 kHz sine wave signal modulates the carrier. The FM CAL control is used to exactly center the carrier on the desired frequency. The frequency error meter on the receiver indicates the exact center when the pointer is at center-scale (zero error). The FM DEV control permits the modulation to be varied, with deviations of up to 20 kHz. The deviation meter on the receiver indicates the degree of modulation. Similarly, depressing the EXT FM button allows the use of an external modulating signal from DC to 20 kHz.

Should it be desired to use both the internal 1 kHz and an external signal to modulate the carrier, simply depress both the INT and EXT FM buttons simultaneously. Concentric controls are provided to allow independent variation of internal or external modulation.

3.2.5 RCVR Mode

In this mode, the Synthesizer is used as the local oscillator for the Monitor. The output frequency of the Synthesizer is automatically offset by the receiver IF to allow the thumbwheel switches to be set to the received signal frequency. In RCVR mode, no signals are produced at the RF output connectors.

3.2.6 IF Mode

In this mode, low-frequency, high-level outputs are available. Signals from 0.1 MHz to 90 MHz are generated. The amplitude is adjustable by the IF OUT control and is at least 1 V into 50 Ω with full output from 0.3 to 10 MHz; at least 0 dBm into 50 Ω from 10 MHz to 90 MHz.

3.3 OPERATION OF THE MONITOR

3.3.1 Wideband Receiver Plug-in

This plug-in has a sensitivity of better than 1 mV over a frequency

range of 20 MHz to 590 MHz. Two bandwidths are available: WIDE-a multiple-stage tuned circuit with a bandwidth of approximately 100 kHz at the -3 dB points; NARROW-a crystal filter with a bandwidth of approximately 17 kHz at the -3 dB points and very steep "skirts". The WIDE position is useful to find a signal whose frequency may be significantly in error. The NARROW position provides extra selectivity to aid in rejecting other signals close to the desired frequency.

3.3.2 Error Meter

The error meter displays the amount that the carrier frequency is in error compared to the frequency selected on the Synthesizer. The precision discriminator which drives the error meter derives its accuracy and zero-set from the Service Monitor reference oscillator. The meter range appropriate to the measurement being made is selected. The volume control for the audio amplifier is also located on this portion of the Monitor. The 10-MHz receiver IF output may be monitored at the RCVR IF OUT connector. Connecting a counter to this point allows precise measurement of frequency error.

3.3.3 Deviation Meter Plug-In

The deviation meter plug-in supplied with this instrument measures the amount by which any modulation is shifting the carrier frequency. The meter circuit is basically a peak detector, although the meter itself will not respond to all short peaks. For this reason, a peak indicator lamp is provided. The recessed adjustment is used to set the point at which the lamp will light. This is most easily set by using the Synthesizer in INT FM mode. In this mode, the meter automatically reads the deviation of the Synthesizer. Set the deviation control on the Synthesizer to give the meter reading desired on the deviation meter. Adjust the peak set control until the lamp lights. The lamp will now flash whenever the deviation exceeds the set point. Note that the set point is based on the range selected - e.g. if the lamp is set to 1 kHz on the 2 kHz range, it will light at 3 kHz on the 6 kHz range and 10 kHz on the 20 kHz range.

The peak detector for the meter (and the peak lamp) may be set to read either positive or negative peaks by means of the +/- switch on the plug-in front panel.

An output is provided on the deviation meter plug-in to permit observation of the detected signal on an oscilloscope. The output is ac-coupled and is designed for a load impedance of at least 10 kΩ.

3.4 ACCURACY OF MEASUREMENT

When the Service Monitor is used for critical measurements, several factors which cause errors must be considered. The following sections describe these factors and offer some practical solutions to problems created by such errors.

3.4.1 Oscillator Stability

The Frequency Synthesizer creates outputs which are all referenced to the 1 MHz crystal-controlled oscillator. Any error in this 1 MHz, due to aging, temperature, or line-voltage fluctuation will cause a proportional error in the output. For example, a 1 Hz error (1 part in 10^6) will cause the output at 100 MHz to be in error by 100 Hz and the output at 900 MHz to be off by 900 Hz.

Temperature variations are minimized by placing the oscillator in a temperature-controlled oven. This oven is operating whenever the instrument is plugged into a power outlet. To obtain best temperature stability, leave the Service Monitor plugged in at all times.

Variations due to line-voltage changes are virtually eliminated since regulated power supplies are used.

The oscillator aging characteristics produce the most significant error. The basic oscillator used in the S1327B ages about 2 parts in 10^8 per day. A higher stability crystal oscillator is available as an option. This oscillator attains aging rates of better than 1 part in 10^9 per day (1 Hz/day at 1000 MHz). The high-stability oscillator is continuously under power with the Service Monitor plugged in. Since aging-rate depends to some extent (and improves) on the length of time the oscillator has been on, it is best to leave power connected to the unit.

Two methods are available to improve the frequency accuracy of the Service Monitor:

1) Frequent calibration with a primary frequency standard. This allows correction of the oscillator frequency to compensate for aging.
2) Substitution of a higher stability external oscillator. The rear-panel 1 MHz input permits usage of a higher stability 1 MHz source.

3.4.2 Frequency Jitter

Any oscillator exhibits some amount of short-term instability. Incidental FM, residual FM, and jitter are terms commonly used to describe this instability. The phase-locked oscillator system used in the S1327B may produce sufficient jitter to be noticeable on the error meter of the Monitor when in the RCVR mode. This same amount of jitter will also be present on the output of the Synthesizer when in CW or FM mode, but will not be visible on the meter.

This type of instability does not actually impair the basic accuracy of the measurement. Since the deviations are small and noncumulative, the only effect is the slight movement of the meter pointer.

3.4.3 Spurious Receiver Inputs

Under severe interference conditions it is possible that the receiver will create spurious mixing products. This condition is usually evidenced by difficulty in obtaining a correct frequency reading and by a noticeable reading on the deviation meter. Use of a tunable preselector plug-in or a filter will often help. Sometimes attenuation of the input signal will eliminate the problem.

3.5 FRONT-PANEL DESCRIPTION

All front-panel controls, connectors and indicators are described in Table 3.1.

TABLE 3.1 FRONT PANEL

FRONT PANEL, MONITOR (top half)

1) VOLume control - adjusts level of audio output signal.

2) RCVR IF OUT BNC connector for counter.

3) INPUT LEVEL lamp - illuminates when sufficient receiver input is present.

4) Pushbutton selector for determining error meter RANGE.

5) Illuminated zero center ERROR KHz meter shows amount the received signal is in error from dialed-in frequency.

6) MIXER INPUT BNC connector (450-512 MHz PRESELECTOR plug-in).

7) Knob on plug-in locking screw. Turn to left to remove, turn to right to tighten (450-512 MHz PRESELECTOR plug-in).

8) PRESELECTOR INPUT BNC connector (450-512 MHz PRESELECTOR plug-in).

9) TUNING meter aids in proper peaking through TUNING control.

10) TUNING/MHz dial indicates the approximate frequency to be received.

11) TUNING adjust control for frequency dialing.

12) PRESELECTOR/MIXER switch selects one of two inputs for receiver (450-512 MHz PRESELECTOR plug-in).

13) WIDE/NARROW switch selects one of two bandwidths for receiver IF (450-512 MHz PRESELECTOR plug-in).

TABLE 3.1 FRONT PANEL (Cont'd)

FRONT PANEL, MONITOR (top half, Cont'd)

14) Deviation Oscilloscope trace H. POSition adjust control.

15) SYNC RANGE selector switch (black knob) provides selection of sweep frequency range of Deviation Oscilloscope.

16) Vernier (red knob in center of SYNC RANGE switch) allows fine-frequency adjustment of Deviation Oscilloscope.

17) VERTICAL-(DEV) selector switch (black knob) used to select frequency deviation range of Deviation Oscilloscope.

18) VERTICAL-V/DIV vernier (red knob) provides fine adjustment of vertical sensitivity of Deviation Oscilloscope.

19) Deviation Oscilloscope trace V. POSition adjust control.

20) Cathode Ray Tube displays visual presentation of input signals to horizontal and vertical channels (DEVIATION OSCILLOSCOPE plug-in).

21) Deviation Oscilloscope beam INTENsity adjust control.

22) Deviation Oscilloscope beam FOCUS adjust control.

23) VERT INPUT BNC connector (DEVIATION OSCILLOSCOPE plug-in).

24) INT/AC/DC switch selects INTernal, AC or DC vertical input for Deviation Oscilloscope plug-in.

25) Knob on plug-in locking screw. Turn to left to remove, turn to right to tighten (DEVIATION OSCILLOSCOPE plug-in).

26) INT/EXT switch selects INTernal or EXTernal horizontal input to Deviation Oscilloscope plug-in.

27) HORIZ INPUT BNC connector (DEVIATION OSCILLOSCOPE plug-in).

FRONT PANEL, SYNTHESIZER (bottom half)

1) Illuminated DEVIATION KHz meter shows amount of modulation (deviation) present on received signal (DEVIATION METER plug-in).

2) OVER-PEAK FM DEV lamp lights whenever deviation exceeds limit set (DEVIATION METER plug-in).

3) Pushbutton selector for determining deviation meter RANGE (DEVIATION METER plug-in).

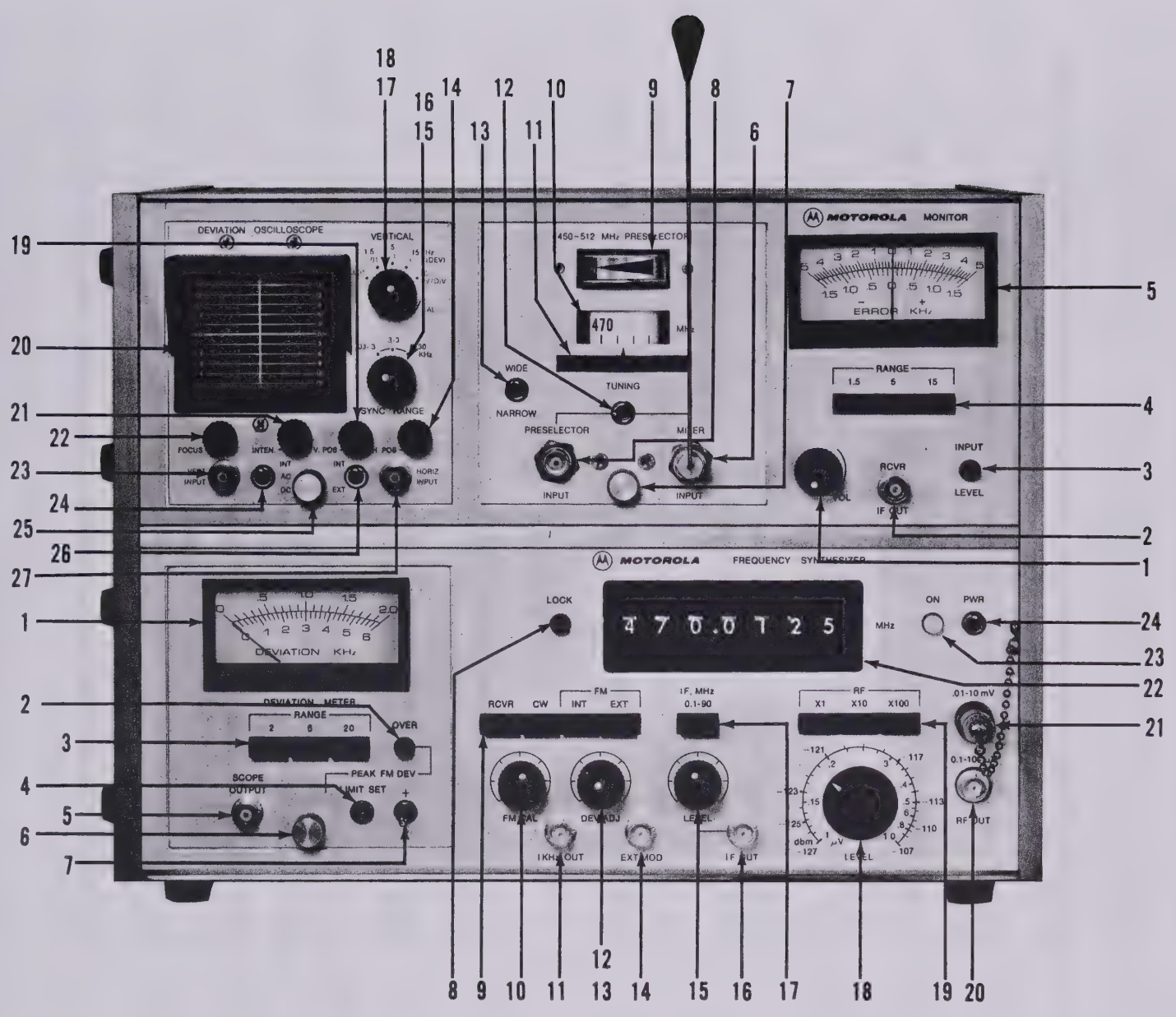


FIGURE 3.1 FRONT PANEL

TABLE 3.1 FRONT PANEL (Cont'd)

FRONT PANEL, SYNTHESIZER (bottom half, Cont'd)

4) Recessed LIMIT SET adjustment for setting limit point of OVER-PEAK FM DEV lamp (DEVIATION METER plug-in).

5) SCOPE OUTPUT BNC connector permits viewing of received audio signal with an oscilloscope (DEVIATION METER plug-in).

6) Knob on plug-in locking screw. Turn to left to remove, turn to right to tighten (DEVIATION METER plug-in).

7) PEAK FM DEV selector switch; (+) selects positive peaks, (-) selects negative peaks (DEVIATION METER plug-in).

8) LOCK lamp, illuminates when SYNTHESIZER is operating properly and within its coverage range.

9) Four-button function selector for the SYNTHESIZER.

RCVR - Causes the SYNTHESIZER to act as the local oscillator for the MONITOR.

CW - Produces an unmodulated output at the RF OUT jacks.

INT-FM - Initiates an output at the RF OUT jacks which is modulated by the internal 1 kHz source.

EXT-FM - Initiates an output at the RF OUT jacks which is modulated by an external dc to 20 kHz source.

10) FM CAL knob - When in either FM mode allows center frequency to be varied.

11) 1 KHz OUT BNC connector is controlled by the INT-DEV ADJ knob (black) and produces up to 1 V rms into 50 Ω.

12) INT-DEV ADJ (black knob) controls the amplitude of the internal 1 kHz used to modulate the carrier. Also controls the 1 kHz OUT amplitude.

13) EXT-DEV ADJ (red knob) controls the amplitude of any external modulating signal.

14) EXT MOD BNC input connector accepts the external modulating signal.

15) IF-LEVEL control adjusts the amplitude of the signal at the IF OUT BNC connector.

16) IF OUT BNC connector feeds a 0.1 MHz to 90 MHz signal as selected by the thumbwheel switches when in IF mode.

TABLE 3.1 FRONT PANEL (Cont'd)

FRONT PANEL, SYNTHESIZER (bottom half, Cont'd)

17) IF, MHz mode selector initiates the output to the IF OUT BNC connector.

18) RF LEVEL control adjusts the amplitude of the signal from the RF OUT jacks.

19) RF LEVEL multiplier selects multiplication factor for RF OUT level.

20) 0.1 to 100 μV RF OUT connector supplies an RF output in this amplitude range when in CW or FM modes.

21) .01 to 10 mV RF OUT connector supplies an RF output in this amplitude range when in CW or FM modes shown with 50 Ω termination.

22) Thumbwheel MHz switches control the output frequency of the SYNTHESIZER.

23) Power ON lamp lights when Service Monitor is energized.

24) PWR on/off switch controls both MONITOR and SYNTHESIZER.

REAR-PANEL DESCRIPTION

TABLE 3.2 REAR PANEL

REAR PANEL, MONITOR (top half)

1) Front panel METER LIGHTS ON/OFF switch.

2) Speaker provides audible output of Monitor modulated signals.

3) REMOTE METERS/speaker connects to remote meters or speaker.

4) R28, C19, L4, L5; Input Board adjustment access ports.

REAR PANEL, SYNTHESIZER (bottom half)

1) FM OSC ADJ adjustment access port.

2) Receptacle, ac line cord connects to 115/230 V power.

3) Oscillator adjustment access ports.

4) 1 MHz INT/EXT switch selects internal or external 1 MHz time base signal at 1 MHz OUT/IN BNC connector.

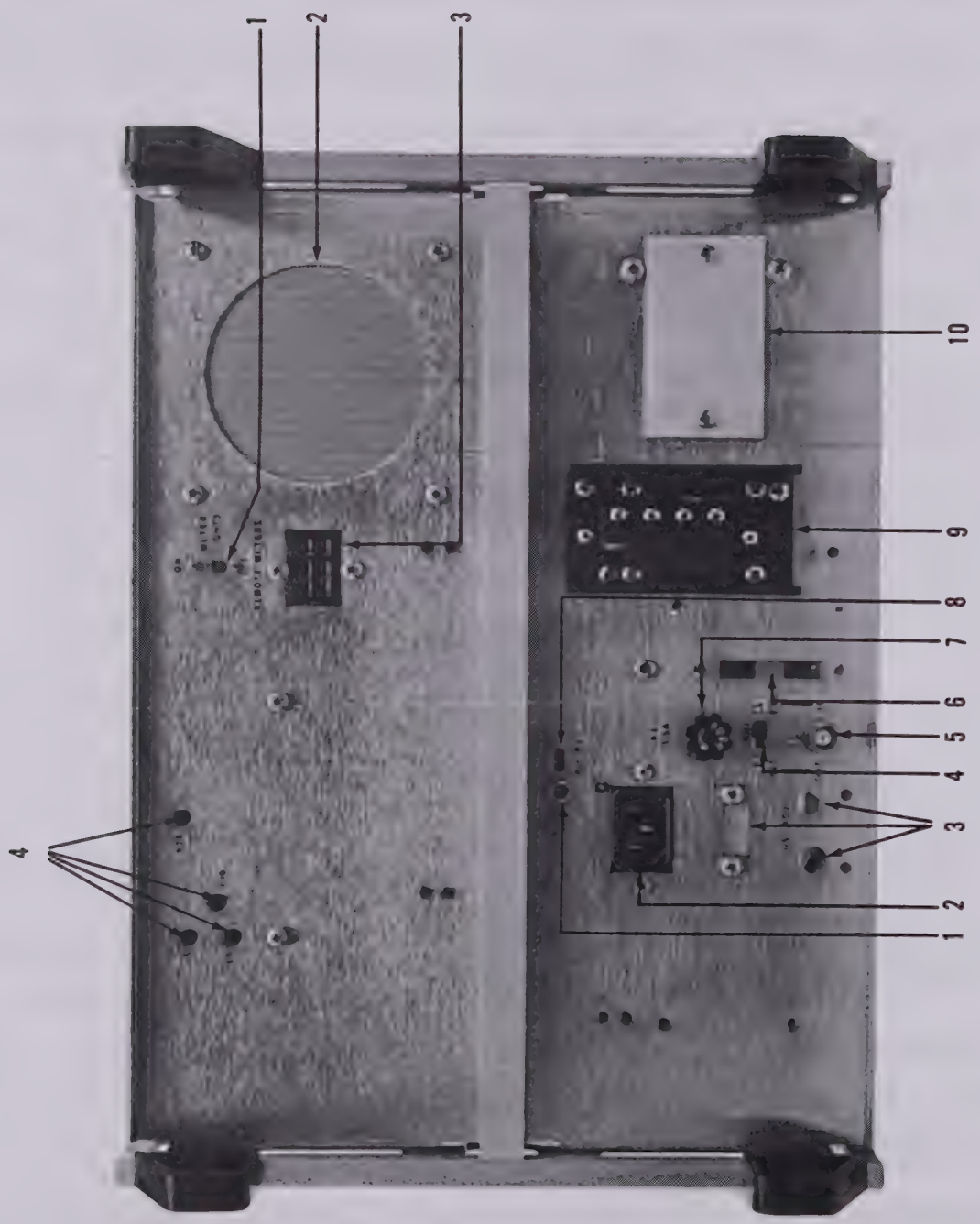


FIGURE 3.2 REAR PANEL

TABLE 3.2 REAR PANEL

REAR PANEL, SYNTHESIZER (bottom half Cont'd)

5) 1 MHz OUT/IN BNC connects internal 1 MHz time base signal out/ external 1 MHz time base signal into the SYNTHESIZER, depending on position of the 1 MHz INT/EXT switch.

6) 115/230 V switch adapts unit to available power line.

7) Line fuse F1 (1.5 A, 115 V; .75 A, 230 V SB).

8) R16, R25; VCO adjustment access port.

9) Power supply regulator transistor heat sink.

10) Cover plate, dc inverter option.

CHAPTER 4
MAINTENANCE & CALIBRATION

4.1 FACTORY SERVICE

Whenever the instrument requires service, the nearest Motorola representative should be contacted. He can provide field service or arrange factory returns when necessary. Address all inquiries on operation or application to your nearest Motorola Communications Division sales/service office listed in the front of this manual. Specify both model and complete serial number in all correspondence.

4.2 ROUTINE MAINTENANCE

A regular program for routine maintenance and inspection every four to six months is recommended for this instrument (the oscillator may require calibration at more frequent intervals). As part of these regular procedures, the instrument should be checked in the following manner:

1) Disconnect ac power and loosen the cover by removing the two screws from the top panel.

2) Make a thorough inspection of all wiring and cables. Check for frayed, loose, or burned wires.

3) Check for physical integrity of all components. Look for burning or cracking, loose solder connections, leakage of insulation compounds, and general physical damage. If a printed-circuit board contains integrated-circuit packages, ensure that all packages are firmly mounted. Never unnecessarily remove or replace a circuit package.

4) Check all front panel switches and controls for loose or broken terminals, loose or sticking shafts, etc.

5) If the internal panel surfaces and components have an excessive amount of dust deposited on them, use a soft brush and low-pressure stream of air to remove the foreign material.

CAUTION

Do not clean P.C. boards or small internal components with a stiff brush or solvents since damage to the circuits may result. A high powered vacuum cleaner device should not be used on small internal components.

6) Wipe the external surfaces of the instrument with a soft, damp cloth to remove dirt, fingerprints, and other foreign material.

7) Replace the cover and reconnect the ac power.

4.3 PRINTED-CIRCUIT BOARD REPAIR

When replacing integrated circuits or other electronic components soldered to printed-circuit boards, the procedures indicated below must be followed or damage to the board may result:

1) Determine by troubleshooting techniques, which integrated circuit or component(s) has failed.

2) Remove the defective component(s) from the board by cutting the pins or leads with a small diagonal clipping tool. (Always remove and replace the entire component.)

3) Apply heat (40-50 W soldering iron) sparingly to each of the cut pins or leads and remove from the board; clean the hole(s) with a toothpick or solder suction tool.

4) Form the tinned leads of the replacement part and insert in the printed-circuit holes; solder, then trim leads to extend 1/16 inch beyond the back surface of the board. (Use only 63-37 solder with maximum 1/16 inch diameter.)

CAUTION

Always trim semiconductor leads only after soldered installation is complete. This procedure greatly lessens the possibility of component failure due to shock-wave damage caused by the trimming tool.

5) When soldering semiconductor devices and all small components, be sure to use a heat sink tool or long-nosed plier connected to the component lead(s) while each is being soldered. Allow the soldered connection to cool before removing the heat sink.

6) Clean all dirt and solder-flux from the printed-circuit traces by liberal application of isopropyl alcohol or freon-type solvents.

4.4 INSTRUMENT DISASSEMBLY PROCEDURES

4.4.1 Top and Bottom Covers

Remove two #6 flathead screws on the cover and slide the cover back to remove. When reinstalling, be sure front edge fits in slot and back lip engages rear panel flange.

4.4.2 Side Covers

Remove front (or rear) corner trim by removing the four #8 screws. Also remove retainer plate from behind the handle. Cover should now slide out. When replacing the corner trim be sure to replace the retainer plate. To do this, place handle over pin in end trim, then place plate over pin so that the other two holes line up with the corresponding holes in the corner trim.

NOTE

When replacing the right-front corner trim (BNC cap and chain), be sure to insert the short screw in the bottom hole.

4.4.3 Separation of Monitor and Synthesizer

Remove the top, bottom, and side covers (remove front trim to remove sides). Then remove the top two screws from the right-rear corner trim and the bottom two screws from the left-rear corner trim. Now slide the Monitor (top) to the left about 2/3 of the way (be careful of the remaining connected leads).

Reverse this procedure to reassemble.

NOTE

Complete separation of the two units is accomplished by disconnecting the coaxial cables and the multiconductor interconnect cable. Observe the proper position of the front and rear mating trim (larger part is inside).

4.4.4 Removal of Monitor Input Assembly

Remove top cover. Disconnect the two coaxial fittings from the Input Assembly located on the rear panel. Separate (pull apart) the small plastic connector to disconnect the power and control wires. Remove Input Assembly by removing the two screws on the rear panel. Reverse this procedure to reassemble noting that the plastic connector is polarized and fits together one way only.

4.4.5 Removal of Receiver Signal Processor

Remove top cover, then remove right side panel. The Signal Processor board is mounted on the right gusset; remove screws to remove the board. To remove the wiring harness connector, remove the two nuts on the spade lugs which hold the connector. Reverse the procedure to reassemble.

4.4.6 Removal of 100 MHz Multiplier Assembly From Synthesizer

Remove the top, bottom, and side covers. Partially separate the Monitor and Synthesizer. Separate (pull apart) the plastic connectors on the wiring harness, disconnect the coaxial connectors, and remove the two screws fastening the multiplier bracket to the mounting plate. Slide the Monitor back onto the Synthesizer and carefully turn units onto the left side. Now remove the two screws which hold the multiplier bracket to the rear panel. Then, remove the six screws holding the side gusset to the frame: by moving this entire assembly slightly, the Multiplier may now be removed.

To reinstall, reverse this procedure noting that the short screws are used in the center and bottom holes in the front of the gusset.

4.4.7 Removal of the RF Assembly

Remove the bottom and right side covers. Remove the four screws holding the RF Assembly to the side gusset, then remove the six gusset mounting screws and the gusset. The RF board cover may now be removed.

To reinstall, reverse the procedure noting that the short screws are to be used in the center and bottom-front holes in the gusset.

4.4.8 Removal of the VCO Assembly

Remove the top and side covers, then partially separate the Monitor and Synthesizer. Disconnect all the coaxial fittings on the VCO can; then, remove the two screws holding the cover to the mounting plate. The assembly may now be folded back for service or removed entirely by separating the plastic connector on the wiring harness.

4.5 CALIBRATION

This section describes the procedures which are used for normal, periodic, field calibration of the Service Monitor. Calibration is recommended every 6 months, (due to oscillator aging).

4.5.1 Preliminary

Verify that the line voltage switch, located on rear panel, is set at 115 or 230 V rms, whichever is applicable. Turn unit on.

4.5.2 Power Supply Adjustment

The power supply regulators have excellent stability and adjustments are normally not required. Power supply voltages are referenced to

chassis ground and should be within the following tolerances:

+5.0 V	0.1 V	(Red Test Point)
-5.20 V	0.05 V	(Green Test Point)
+15.0 V	0.3 V	(Blue Test Point)
-15.0 V	0.3 V	(Violet Test Point)

Adjustment potentiometers are adjacent to the respective test points. Exact location of these adjustments may be determined from the A9 Board parts location drawing.

OUTPUT	ADJUSTMENT POTENTIOMETER
+5.0 V	R24
-5.20 V	R31
+15.0 V	R6
-15.0 V	R14

Measurements should be made with a digital voltmeter such as the Systron-Donner Model 7004A.

4.5.3 Oscillator Adjustment

Any heated oscillator used in the Service Monitor should be plugged in and allowed to run uninterrupted for 72 hours prior to setting the frequency. In addition, instruments using the basic oscillator must be turned ON for this period of time to achieve best operational stability.

To set the oscillator, connect a reference 1 MHz signal with accuracy of at least 1 part in 10^{-10} short term to the external trigger of a Tektronix Model 581 Oscilloscope with Type 82 Plug-in. With the oscilloscope set to .01 µs/cm (expander on) and triggered externally, connect the input to the rear panel 1 MHz BNC connector. Turn the INT/EXT switch to INT and set the oscillator adjustment (s) for a stationary waveform on the oscilloscope. This method permits the operator to visually determine the optimum setting. An error of 1 part in 10^{-9} is indicated if the displayed waveform moves full screen in 10 seconds.

4.5.4 Synthesizer Calibration

The Synthesizer portion of the S1327B has four subassemblies which contain calibration adjustments.

4.5.4.1 Power Supply

The power supply regulator adjustments are described elsewhere in the Calibration Section under routine maintenance.

4.5.4.2 100 MHz Multiplier Assembly

This module has three adjustments: the first to center the operating point of the voltage-controlled oscillator, the next to adjust the tuning of the 100 MHz Amplifier, and the last to adjust the tuning of the 10 MHz Amplifier.

1) Test Equipment Required

   a) High impedance dc voltmeter - at least 100 kΩ.

   b) Oscilloscope capable of displaying a 100 MHz signal.

2) Adjustment Location

   The adjustment to center the voltage-controlled oscillator and the associated test point are accessible through the edge of the housing without removing anything other than the bottom cover. The other two adjustments require removal of the oscillator bracket and filter.

3) Adjustment Procedure

   a) Monitor the test point with the voltmeter set to read a voltage between +.5 V and +2.5 V.

   b) Adjust L1 to give a reading of about 1.8 V.

   c) Monitor J3 with the scope and set the Synthesizer frequency to any setting with a "2" in the most left-hand digit. Adjust L3 for maximum amplitude as shown on the scope (100 MHz).

   d) Monitor J1 with the scope and select CW mode. Adjust L4 for maximum amplitude as shown on the scope (10 MHz).

4.5.4.3 VCO Assembly

The VCO Assembly contains four adjustments. One control adjusts the 10 MHz voltage-controlled oscillator center frequency; the second control tunes the 10 MHz buffer amplifier; and the remaining two controls are used to adjust the amplitude of the output signal for balance between CW and FM modes.

1) Test Equipment Required

   a) Oscilloscope capable of displaying a 10 MHz signal.

   b) Spectrum Analyzer (for balance adjustments only).

   c) High impedance dc voltmeter.

2) Adjustment Location

a) The adjustment of the oscillator and the balance adjustments are accessible from the rear panel of the instrument through small access ports. To access the adjustment of C21, separate the Monitor from the Synthesizer and lift the VCO Assembly.

3) Adjustment Procedure

a) Select EXT FM mode and center the front panel FM CAL control by first turning 6 turns counterclockwise; then back clockwise 2-1/4 turns. Adjust C10 to give a reading of 5.2 V on the test point on the side of the VCO.

b) With EXT FM mode selected, monitor J2 with the scope and adjust C21 for a maximum display.

c) Select an output frequency of 155.3000 MHz, connect the Spectrum Analyzer to the high-level RF OUT connector. Set the attenuator to -112 dBm, push the X10 button, and select CW mode. Adjust R25 for maximum output as displayed on the analyzer, then reduce the amplitude 1 dB with R25. Select EXT FM mode (no modulation) and adjust R16 following the R25 adjustment procedure outlined above. Switch from EXT FM to CW mode and ascertain that the output does not vary.

4.5.4.4 RF Assembly

The RF Assembly contains all the circuitry for generating the calibrated test equipment. The procedures described here provide information for those with the facilities to make these measurements. It is recommended that both this procedure and the circuit description be read prior to starting.

1) Test Equipment Required

a) Spectrum Analyzer (preferable, one with a first IF of about 2 GHz).

b) High impedance digital voltmeter.

2) Oscillator Range Adjustment

a) Dial in 90.0000 MHz in the CW mode and adjust L2 for a voltage of about 3.0 V on terminal #1.

b) Change frequency to 109.9900 MHz and verify that the voltage does not exceed 12.0 V; if it does, readjust L2 for 12.0 V and recheck at 90 MHz for a voltage not under 2.5 V.

c) Change frequency to 110.0000 MHz and adjust L6 for a voltage of 2.05 V on terminal #1.

d) Change frequency to 149.9900 MHz and verify that the voltage is not over 13.1 V; if it is, readjust L6 to split the difference at the two extremes.

e) Change frequency to 150.0000 MHz and adjust L9 for a voltage of 2.05 V on terminal #1.

f) Change frequency to 189.9900 MHz and verify that the voltage is below 12.5 V; if not, readjust L9 to split the difference at the two extremes.

3) Output Amplitude Calibration (RF LEVEL: -112; X10 Switch: ON)

a) Select a frequency of 155.3000 MHz and adjust R128 for -52 ±2 dBm output as seen on the analyzer.

b) Change the frequency to 55.3000 MHz and tune L18, L19, and L20 for maximum output. Adjust R129 (from back of box) for -52 ±2 dBm. This also adjusts 225 MHz.

c) Change the frequency to 355.3000 MHz and tune L21 and L22 for maximum output. L18 may need to be adjusted. Adjust R130 for -52 ±2 dBm.

d) Repeat Steps b) and c) as required since there is some interaction.

e) Change the frequency to 455.3000 MHz and tune C82, L27, and L28 for maximum output. Adjust R132 for -52 ±2 dBm.

f) Change the frequency to 555.3000 MHz and tune L25 and L26 for maximum output. Adjust R131 for -52 ±2 dBm.

g) Change the frequency to 655.3000 MHz. Adjust C112, C116, and the tap point on loops L31 and L32 for -52 ±5 dBm. Be careful not to move the taps too far from the ground end as this will give very little improvement in amplitude and will produce many spurious signals.

h) Change the frequency to 755.3000 MHz. Adjust C122, C126, and the tap point on loops L34 and L35 for -52 ±5 dBm. Observe the same caution as in Step g).

i) Change the frequency to 855.3000 MHz. Adjust C132, C136, and the tap point on loops L36 and L37 for -52 ±5 dBm. Observe the same caution as in Step g).

j) Change the frequency to 955.3000 MHz. Adjust C102, C106, and the tap point on loops L29 and L3 for -52 ±5 dBm. Observe the same caution as in Step g).

k) For maximum accuracy, recheck setting using a receiver of known sensitivity.

4.5.5 Monitor Calibration and Adjustment

1) Input Board

There are four adjustments on this assembly. These are accessible through ports in the rear panel. To adjust coils L4 and L5, select EXT FM mode, and set the Error Meter to center (zero) with the FM CAL control knob. Using a totally non-metallic tuning tool whose blade is about 3/32 inch wide, adjust L4 and L5 for a maximum output at the monitor RCVR IF OUT jack as viewed on an oscilloscope capable of measuring 10 MHz.

Adjustment of capacitor C19 is used to obtain equal outputs in the wide and narrow bandwidths of the Monitor; C19 adjusts the output in the "wide mode". To adjust trimmer C19, use setup procedure outlined in above paragraph, switch from WIDE to NARROW and back to WIDE while adjusting C19 to obtain an unvarying output.

2) Signal Processor

All four adjustments on this assembly may be reached by removing the top cover.

a) Threshold Adjustment

A Broadband Mixer plug-in (SLN6352A) must be used for the Threshold Adjustment. Potentiometer R11 Controls the turn-on point of the monitor circuits. Adjust this level by connecting a 10 MHz bandwidth oscilloscope to the Monitor RCVR IF OUT jack, and a variable-level signal source of any frequency to the INPUT jack (20-990 MHz). Then dial in the frequency and adjust the generator for a zero error reading. With the bandwidth of the Monitor set to WIDE, increase the amplitude to the generator to give a maximum oscilloscope display. Note the signal amplitude on the oscilloscope. Now decrease the generator amplitude until the oscilloscope display is about 75% of the previous maximum. Adjust R11 to turn on the INPUT LEVEL light at this point. It is advisable to "rock" the generator amplitude back and forth through the 75% point to ensure a proper setting for R11.

b) Output Level Calibration

Connect a cable from the synthesizer IF OUT jack to the Broadband Mixer INPUT jack. Depress *both* the Synthesizer IF and RCVR pushbuttons simultaneously. Dial the thumbwheel switches for a frequency setting of 10.0150 MHz. Monitor the voltage at TP1 with an accurate (0.1% or better) digital voltmeter, and adjust R42 for -1.50 ±.01 volts.

c) Error Meter Calibration

Using the set up and calibration procedure outlined for Output Level Calibration, adjust potentiometer R52 for an Error Meter reading of -15 kHz.

d) Audio Discriminator

Select INT FM mode and adjust modulation to 5 kHz. Using a totally nonmetallic tuning tool whose blade is about 3/32 inch wide, adjust L2 for maximum audio output as monitored across the speaker with an oscilloscope.

4.6 TROUBLESHOOTING

This section provides basic troubleshooting procedures. Refer to the circuit descriptions for isolation of operational problems.

4.6.1 General Notes

As a first step in any troubleshooting, check the power supply voltages and set them within the recommended tolerances. If any voltage test point reads exactly zero, measure that point with an ohmmeter to see if a short to ground is present.

All measurements called for can be made with an oscilloscope equivalent to Tektronix Model 581 with a Type 80 Plug-in, a digital voltmeter equivalent to the Motorola T1048A, or the Systron-Donner 7004A. Be careful when using plug-in boards from another instrument as there are restrictions on interchangeability. See list elsewhere in this section.

Integrated circuit logic levels are 0 V to .8 V for a low or "0" state, 3.5 V to 5 V for a high or "1" state. Any reading between these two indicates a problem.

4.6.2 Troubleshooting Lock Problems

A troubleshooting tree is provided to aid in analyzing a no-lock condition. It is also helpful to have a known, good plug-in board to exchange when attempting to isolate a problem; if available, one from another instrument may often be used (see General Notes).

4.6.3 Control Logic Board, A3

A truth table is included to simplify location of defective components. This table gives the logic levels of all outputs for the normal inputs.

4.6.4 Phase Detector Board, A8

Since this board is part of the closed-loop lock system, locating defective components can be difficult. It is recommended that prior to making measurements on this board, the control loop should be opened. To do this, disconnect the wire from terminal #1 on the A12 board, and temporarily jumper terminal #2 to terminal #1. Now set the frequency to 110 MHz in the CW mode. This procedure will cause the voltage-controlled oscillator to run at one frequency and greatly simplify making measurements on the A8 board. Waveform and voltage measurements may now be made to isolate any faults on the board.

4.6.5 Divide-by-N Board, A6

The same comments apply here as noted for the A8 board. The same procedure is recommended.

4.6.6 Plug-in P.C. Board Interchangeability

The power supply regulator, A9, may be interchanged with any serial number instrument.

Divide-by-N P.C. boards, A6, with a (-2) following the part number on the P.C. board are to be used with serial numbers 101-200 only.

Time base P.C. boards, A1, with a (-2) following the part number on the P.C. board are to be used with serial numbers 101-200 only.

Control logic P.C. boards, A3, with a (-3) following the part number on the P.C. board are to be used with serial numbers 101-200 only.

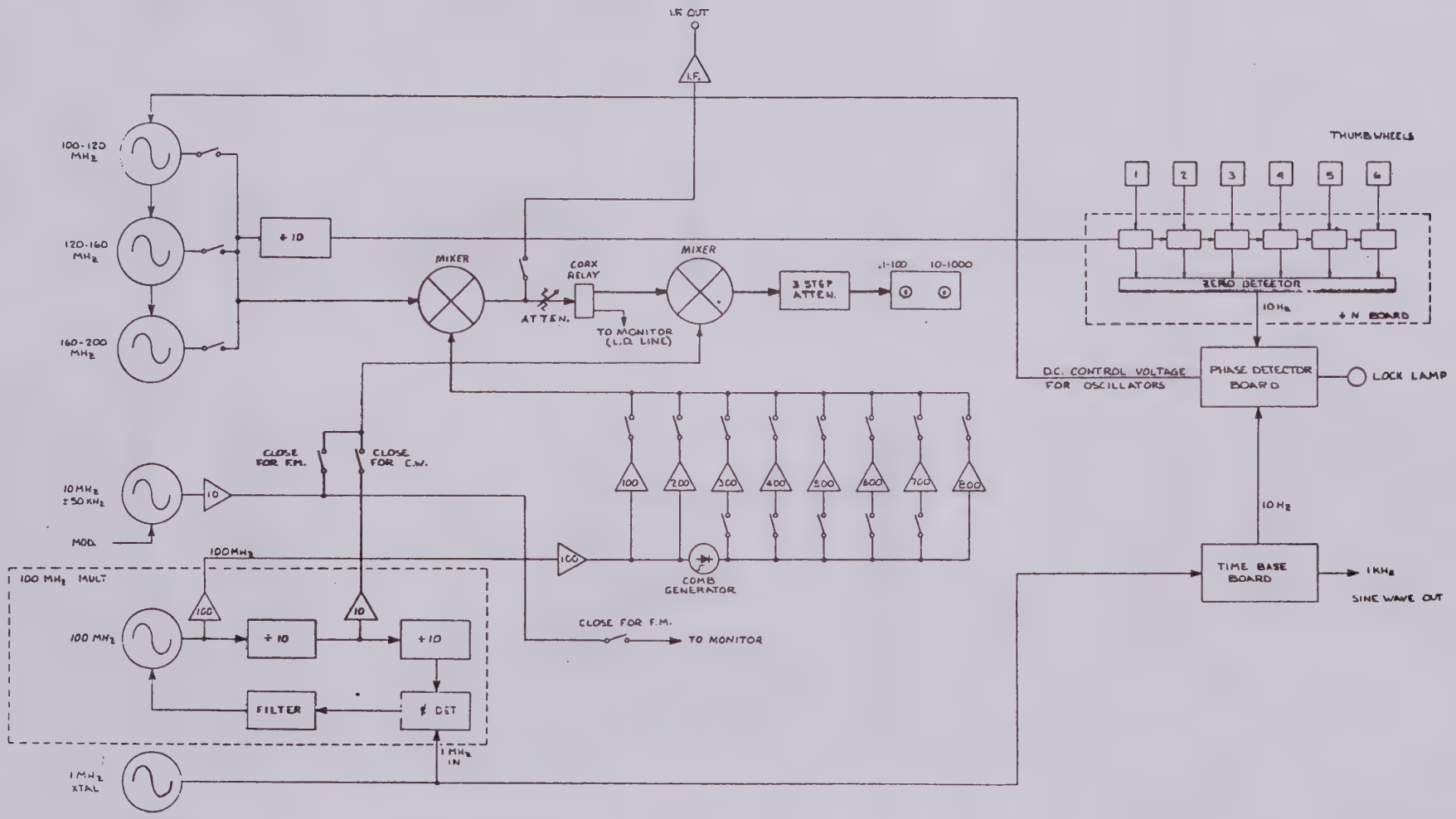
CHAPTER 5
CIRCUIT DESCRIPTIONS

5.1 INTRODUCTION

Contained in this chapter are the circuit descriptions, assemblies, schematics, and parts lists for the standard S1327B.

5.2 CIRCUIT DESCRIPTIONS, DRAWINGS, AND PARTS LISTS

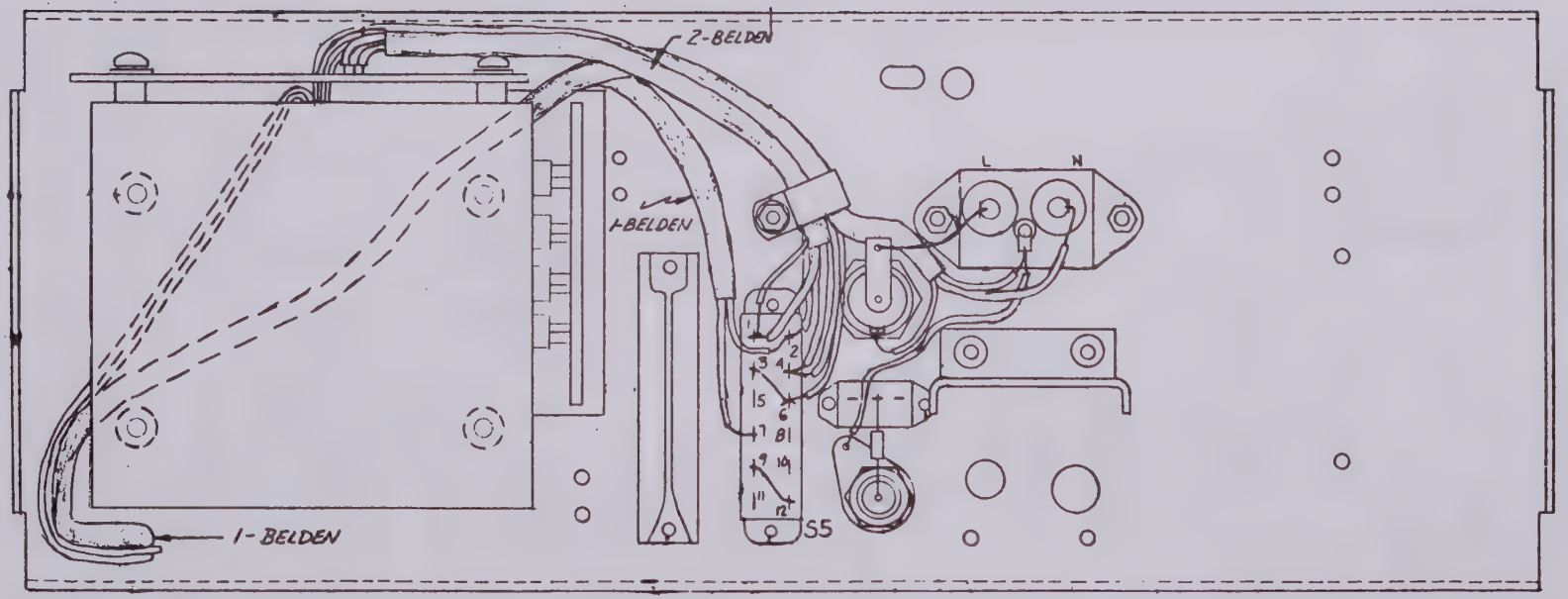
Ref.	Description	Assembly	Schematic
	SYNTHESIZER		
	Block Diagram	---	7-053404
	Front Panel Subassembly	053539	---
	Rear Panel Subassembly	053312	---
A1	Time Base Divider	39501	39498
A2	Not Used		
A3	Control Logic Board	39509	39506
A4	Not Used		
A5	Not Used		
A6	Divide-By-N Board	04568001	7-04568001
A7	Not Used		
A8	Phase Detector Board	45548	45545
	Power Supply	---	7-05352101
	Power Supply Heat Sink	053260	7-05352101
A9	Power Supply Regulator	39513	39514
A10	Carrier Card	053221	---
A11	VCO Board	05327401	7-05327401
A12	RF Board	05337501	7-05337501
A13	Attenuator	053482	---
A14	100 MHz Multiplier	39524	39521
A15	RF Out	053481	---
A16	Mixer	053400	---
	MONITOR		
	Block Diagram	---	7-053518
	Front Panel Subassembly	053268	---
	Rear Panel Subassembly	053269	---
A1	Not Used		
A2	Input Board	39607	39604
A3	Receiver Signal Processor	05326701	7-05326701



(SYNTHESIZER) FUNCTIONAL BLOCK DIAGRAM 053520

SYNTHESIZER, FINAL ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
A16	Mixer Assembly	**053400A**
C1	Capacitor, .01 µF	C0562
C2	Capacitor, .01 µF	C0562
C3	Capacitor, .01 µF	C0562
C7	Capacitor, 13,000 µF, 12 V	C1122
C8	Capacitor, 4,600 µF, 15 V	C1112
J7	Connector, 24 Pin, F	09061440
S1	Switch, Thumbwheel	39584
Y1	Oscillator,Crystal	Y0023
	Octal Socket	X0004
	Front Panel Subassembly	053539A
A13	Attenuator Assembly	053482A
A15	RF Out Assembly	053481A
I3	Light, Green	I0104
I4	Light, White	I0103
J2	BNC Connector	J0260
J3	BNC Connector	J0260
J4	BNC Connector	J0260
R1	Potentiometer, 500 Ω, Dual Concentric	R2708
R2	Potentiometer, 500 Ω, Dual Concentric	R2708
R3	Resistor, 3.3 k, 1/4 W, 5%	R0742
R4	Resistor, 3.3 k, 1/4 W, 5%	R0742
R5	Potentiometer, 25 k	R2712
R6	*Potentiometer, 50 k	102913
R7	Resistor, 8.2 k, 1/4 W, 5%	R0883
R8	Resistor, 390 k, 1/4 W, 5%	R2420
R9	Potentiometer, 250 k	R2707
R10	Resistor, 8.2 k, 1/4 W, 5%	R0883
S2	Switch, Pushbutton	045821
S3	Switch, SPDT	S0149
1	Knob Concentric Base	045745
2	Knob Concentric, Red	H1297
3	Knob	H1982
4	Skirted Knob	H0679
5	Lamp Socket	X0133



(SYNTHESIZER), REAR PANEL SUBASSEMBLY 053312

SYNTHESIZER, FINAL ASSEMBLY PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
	Rear Panel Subassembly	053312C
1	Heat Sink Assembly	39825
2	Resistor, 470 Ω, 1/4 W, 5%	R1044
F1	Fuse, 1 1/2 A SB	F0019
J1	Connector, BNC	J0260
3	Line Filter	Z0008
4	Fuse Holder	X0034
S4	Switch, SPDT, Slide	05034990
S5	Switch, 4PDT, Slide	S0363
	Carrier/Transformer Assembly	053314
	Card Cage Assembly	053312
1	Single Row 22 Pin P.C. Connector	J0195
2	Dual 22 Pin P.C. Connector	J0246
3	Dual 22 Pin P.C. Connector	J0246
4	Dual 22 Pin P.C. Connector	J0246
5	Relay, Coaxial	039743

* For units with serial numbers 1301 to 1400, R6 is 10k potentiometer, Part No. R2738.

CIRCUIT DESCRIPTION
TIME BASE DIVIDER
SCHEMATIC #39498B
A1 (SYNTHESIZER)

The Time Base Board contains: 1) the Oscillator Shaping Circuits; 2) a Divider Chain; and 3) various control circuits.

1) OSCILLATOR SHAPING CIRCUITS

The oscillator shaper/divider circuit is designed to accept an input of 1,3, or 4 MHz, sine or square wave, and produce a square wave 1 MHz output. Various jumpers are provided to allow easy field change of oscillator option. Transistors Q3 and Q4 provide amplification and shaping for the 3 or 4 MHz oscillator input on pin 13. The output from Q4 is a logic level (+5 V and 0 V) signal which feeds divider U6. This integrated circuit may be connected to divide-by-three or by-four (see tabulation on schematic); if a 3 or 4 MHz oscillator is used then jumper W5 is installed. If a 1 MHz oscillator is to be used, it is connected to pin 14 and jumper W6 is installed instead of W5. Transistor Q8, provides amplification at this point. The output from Q8 goes to the rear-panel INT/EXT switch and connector via pin 17.

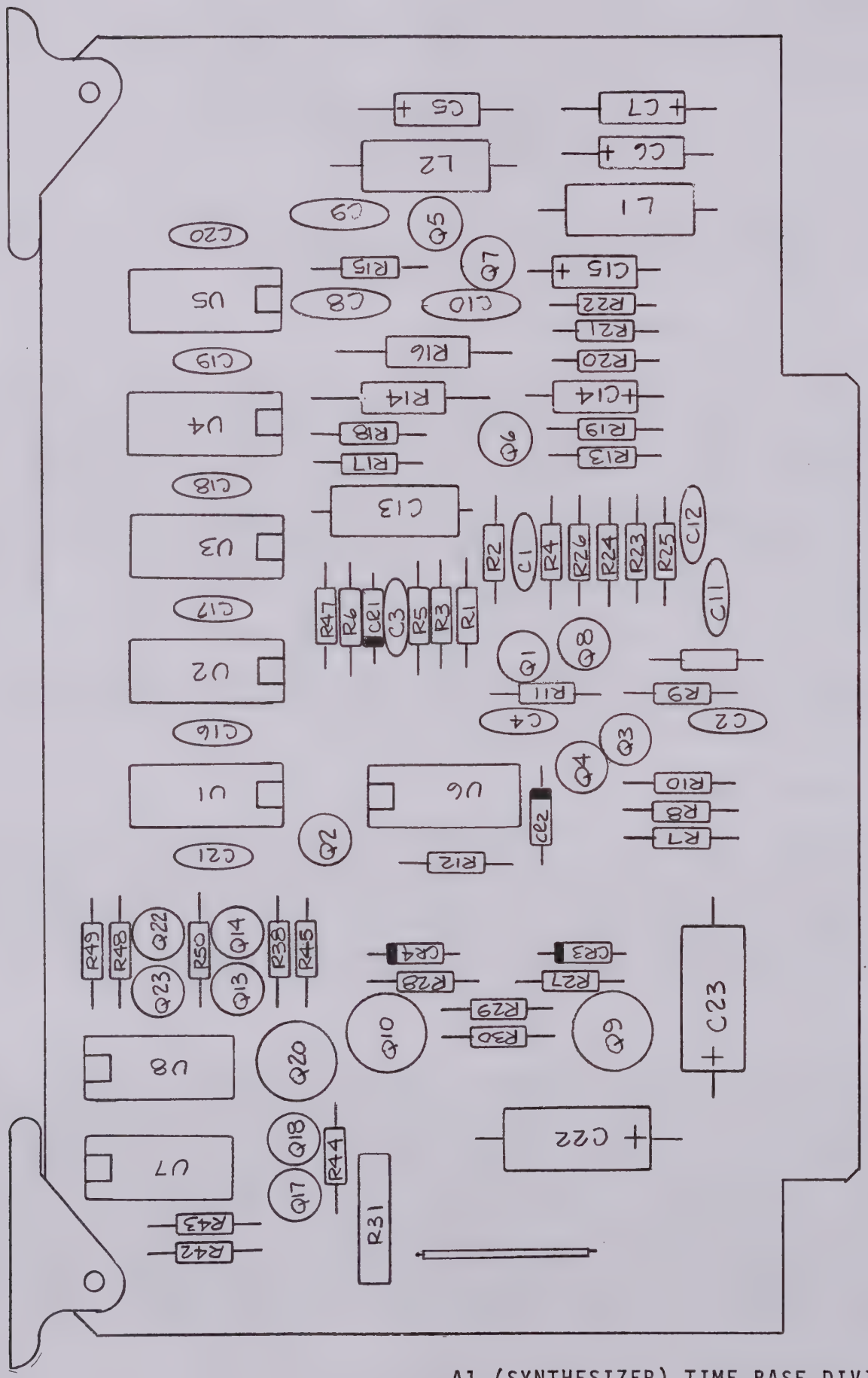
The signal on pin 15 (from Q8 if in INT, or from an external 1 MHz if in EXT) is further amplified by Q1 and shaped to logic levels by Q2. The output on pin L is the reference 1 MHz.

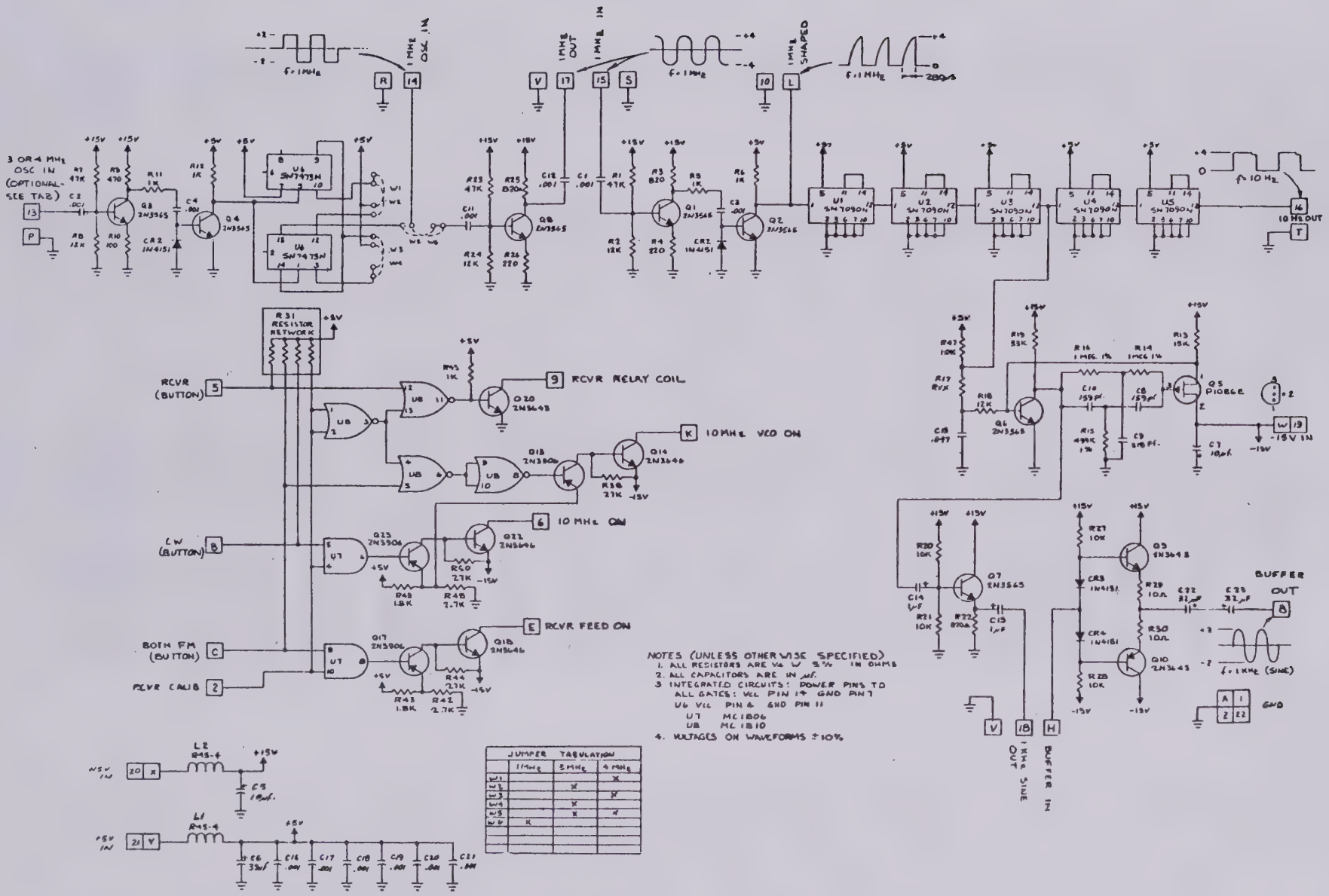
2) DIVIDER CHAIN

Integrated circuits U1 - U5 successively divide the 1 MHz down by factors of 10. The 10 Hz reference for the phase detector is available on pin 16. The output from U3 at 1 kHz, is used to drive an active filter. Transistors Q5 and Q6, along with network R14, R15, R16, C8, C9, and C10, filter the 1 kHz square wave and produce a low-distortion sine wave. Buffer Q7 is connected as an emitter-follower. Transistors Q9 and Q10 provide a low-impedance output for the 1 kHz.

3) VARIOUS CONTROL CIRCUITS

The remaining circuitry performs a variety of control functions. Specific details of these functions are covered elsewhere. The circuit operation is as follows: Three identical level shift circuits are employed to convert from +5 V logic levels to -15 V control levels. For example, a low input (0 V) at the base of Q17 turns it on. This produces a base current in Q18 turning it on. In this way, the load connected to the collector of Q18 is supplied -15 V. When a high input (over +2.5 V) is present on the base of Q17 it is off since the emitter is biased at +3 V. Q18 now turns off since there is no longer any base current for it. The integrated-circuit gates perform logic functions required to operate the control lines at the proper time.


A1 TIME BASE ASSEMBLY 39501
C5 +
C7 +
L2
C6 +
L1
C9
Q5
Q7
C20
R15
C15 +
U5
C8
C10
R22
R21
R16
R20
C19
R14
+C14
U4
R18
R19
Q6
R17
R13
C18
C13
U3
R2
C1
R4
R26
R24
R23
R25
C12
C11
C17
R47
R6
C61
C3
R5
R3
R1
U2
Q1
Q8
R11
R9
C16
C4
C2
Q4
Q3
U1
U6
R10
R8
C62
R7
Q2
R12
C21
R49
R48
Q22
Q14
R38
R45
Q23
R50
Q13
CR4
CR3
R28
R27
C23 +
R29
Q10
Q9
R30
U8
Q20
Q18
C22 +
U7
R44
Q17
R43
R42
R31



NOTES (UNLESS OTHERWISE SPECIFIED)
1. ALL RESISTORS ARE ¼ W 5% IN OHMS
2. ALL CAPACITORS ARE IN μf.
3. INTEGRATED CIRCUITS: POWER PINS TO ALL GATES: Vcc PIN 14 GND PIN 7
   U6 Vcc PIN 4 GND PIN 11
   U7 MC1806
   U8 MC1810
4. VOLTAGES ON WAVEFORMS ±10%

JUMPER TABULATION			
	1 MHz	3 MHz	4 MHz
W1		X	
W2			X
W3		X	
W4			X
W5	X		
W6			

A1 (SYNTHESIZER), TIME BASE SCHEMATIC 39498

A1 (SYNTHESIZER), TIME BASE DIVIDER PARTS LIST

REF.	DESCRIPTION	SD PART NO.
A1	Time Base Divider Assembly	39501B
A1	Time Base Divider Schematic	39498B
C1	Capacitor, .001 µF	C0424
C2	Capacitor, .001 µF	C0424
C3	Capacitor, .001 µF	C0424
C4	Capacitor, .001 µF	C0424
C5	Capacitor, 10 µF, 20 V, Tant	C0353
C6	Capacitor, 39 µF, 10 V, Tant	C0902
C7	Capacitor, 10 µF, 20 V, Tant	C0353
C8	Capacitor, 159 pF, DM	C1146
C9	Capacitor, 318 pF, DM	C1145
C10	Capacitor, 159 pF, DM	C1146
C11	Capacitor, .001 µF	C0424
C12	Capacitor, .001 µF	C0424
C13	Capacitor, .047 µF	C0700
C14	Capacitor, 1 µF, 35 V, Tant	C0524
C15	Capacitor, 1 µF, 35 V, Tant	C0524
C16	Capacitor, .001 µF	C0424
C17	Capacitor, .001 µF	C0424
C18	Capacitor, .001 µF	C0424
C19	Capacitor, .001 µF	C0424
C20	Capacitor, .001 µF	C0424
C21	Capacitor, .001 µF	C0424
C22	Capacitor, .32 µF	03290200
CR1	Diode, IN4151	CR0150
CR2	Diode, IN4151	CR0150
CR3	Diode, IN4151	CR0150
CR4	Diode, IN4151	CR0150
L1	Inductor, R45-1	L0143
L2	Inductor, R45-1	L0143
Q1	Transistor, 2N3565	Q0237
Q2	Transistor, 2N3565	Q0237
Q3	Transistor, 2N3565	Q0237
Q4	Transistor, 2N3565	Q0237
Q5	Transistor, P1086E	Q0309
Q6	Transistor, 2N3565	Q0237
Q7	Transistor, 2N3565	Q0237
Q8	Transistor, 2N3565	Q0237
Q9	Transistor, 2N3643	Q0179

A1 (SYNTHESIZER), TIME BASE DIVIDER PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
Q10	Transistor, 2N3645	Q0215
Q11	Not Used	
Q12	Not Used	
Q13	Transistor, 2N3906	Q0248
Q14	Transistor, 2N3646	Q0218
Q15	Not used	
Q16	Not used	
Q17	Transistor, 2N3906	Q0248
Q18	Transistor, 2N3646	Q0218
Q19	Not used	
Q20	Transistor, 2N3643	Q0179
Q21	Not used	
Q22	Transistor, 2N3646	Q0218
Q23	Transistor, 2N3906	Q0248
R1	Resistor, 47 k, 1/4 W, 5%	R0777
R2	Resistor, 12 k, 1/4 W, 5%	R0759
R3	Resistor, 820 Ω, 1/4 W, 5%	R0762
R4	Resistor, 220 Ω, 1/4 W, 5%	R0760
R5	Resistor, 1 k, 1/4 W, 5%	R0765
R6	Resistor, 1 k, 1/4 W, 5%	R0765
R7	Resistor, 47 k, 1/4 W, 5%	R0777
R8	Resistor, 12 k, 1/4 W, 5%	R0759
R9	Resistor, 470 Ω, 1/4 W, 5%	R1044
R10	Resistor, 100 Ω, 1/4 W, 5%	R0966
R11	Resistor, 1 k, 1/4 W, 5%	R0765
R12	Resistor, 1 k, 1/4 W, 5%	R0765
R13	Resistor, 15 k, 1/4 W, 5%	R0728
R14	Resistor, 1 M, 1%	R2152
R15	Resistor, 499 k, 1%	R2372
R16	Resistor, 1 M, 1%	R2152
R17	Resistor, Factory Selected (10 k nom)	RXXXX
R18	Resistor, 12 k, 1/4 W, 5%	R0759
R19	Resistor, 3.3 k, 1/4 W, 5%	R0742
R20	Resistor, 10 k, 1/4 W, 5%	R0766
R21	Resistor, 10 k, 1/4 W, 5%	R0766
R22	Resistor, 820 Ω, 1/4 W, 5%	R0762
R23	Resistor, 47 k, 1/4 W, 5%	R0777
R24	Resistor, 12 k, 1/4 W, 5%	R0759
R25	Resistor, 820 Ω, 1/4 W, 5%	R0762

A1 (SYNTHESIZER), TIME BASE DIVIDER PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R26	Resistor, 220 Ω, 1/4 W, 5%	R0760
R27	Resistor, 10 k, 1/4 W, 5%	R0766
R28	Resistor, 10 k, 1/4 W, 5%	R0766
R29	Resistor, 10 Ω, 1/4 W, 5%	R0739
R30	Resistor, 10 Ω, 1/4 W, 5%	R0739
R31	Resistor Network	27867
R32	Not Used	
R33	Not Used	
R34	Not Used	
R35	Not Used	
R36	Not Used	
R37	Not Used	
R38	Resistor, 27 k, 1/4 W, 5%	R0824
R39	Not Used	
R40	Not Used	
R41	Not Used	
R42	Resistor, 2.7 k, 1/4 W, 5%	R0937
R43	Resistor, 1.8 k, 1/4 W, 5%	R0959
R44	Resistor, 27 k, 1/4 W, 5%	R0824
R45	Resistor, 1 k, 1/4 W, 5%	R0765
R46	Not Used	
R47	Resistor, 10 k, 1/4 W, 5%	R0766
R48	Resistor, 2.7 k, 1/4 W, 5%	R0937
R49	Resistor, 1.8 k, 1/4 W, 5%	R0959
R50	Resistor, 1.8 k, 1/4 W, 5%	R0959
U1	Integrated Circuit, SN7090N	25732
U2	Integrated Circuit, SN7090N	25732
U3	Integrated Circuit, SN7090N	25732
U4	Integrated Circuit, SN7090N	25732
U5	Integrated Circuit, SN7090N	25732
U6	Integrated Circuit, SN7473N	19709
U7	Integrated Circuit, MC1806P	25733
U8	Integrated Circuit, MC1810P	25735

CIRCUIT DESCRIPTION
CONTROL LOGIC BOARD
SCHEMATIC #39506B
A3 (SYNTHESIZER)

The Control Logic Board provides the necessary control signals to operate the RF board and associated circuits. Control is provided for: 1) oscillator switching and phase detector gain change; 2) multiplier selection; and 3) "LOCK" lamp disable.

1) OSCILLATOR SWITCHING AND PHASE DETECTOR GAIN CHANGE

The oscillator switching and phase detector gain change functions are dependent on two parameters. If the Synthesizer is in any mode other than IF, the oscillators actually must run 10 MHz higher than the setting indicates. In IF mode, the oscillator frequency is as selected. Converter U10 takes the binary-coded-decimal (BCD) information from the "10's-of-MHz" switch and converts it to decimal numbers. This decimal information is then gated according to the selected mode and determines which oscillator to use for the required frequency. The phase detector gain-change control line is gated to produce a low-level whenever an oscillator is to operate in the top 10 MHz of its range.

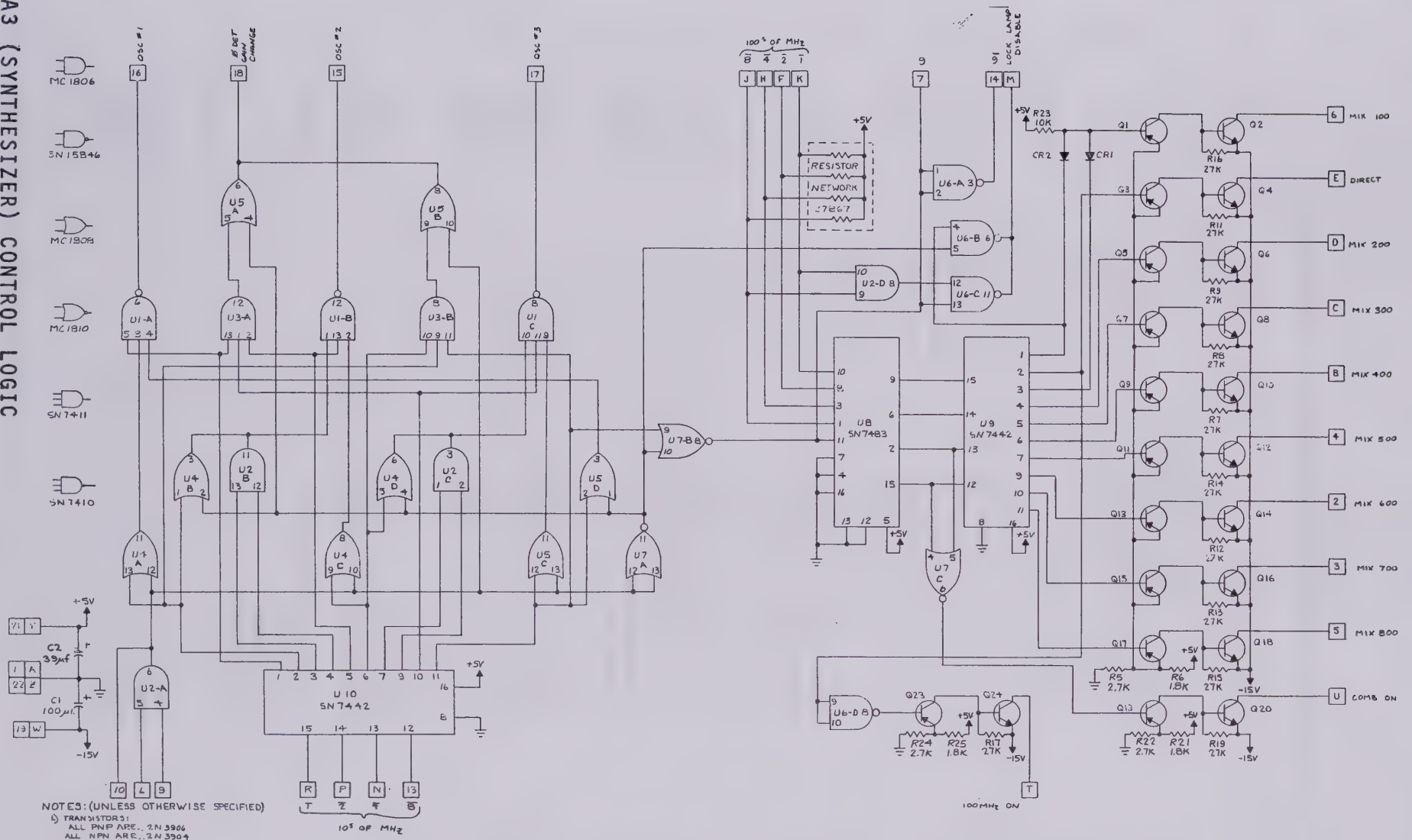
2) MULTIPLIER SECTION

The majority of the remaining circuitry is used to control the input to the second mixer on the RF board. Integrated circuit U8 is a binary full-adder. Its function is to add one to the number selected in the "100's-of-MHz" position, whenever a nine is selected in the "10's-of-MHz" position. Exception: This is not done in IF mode. Gate U7-B performs the exception. The output from U8 feeds U9, another BCD-to-decimal converter. Each output from U9 drives a pair of transistors which convert from 5 V logic levels to -15 V for switching purposes. Diodes CR1 and CR2 perform an OR function to select the 100 MHz signal for either a dialed-in 0 or a dialed-in 2. U7-C detects a number of four or greater, and supplies a signal to turn on the comb generator. U6-D controls the 100 MHz amplifier on the RF board, turning it off when in the direct range.

3) "LOCK" LAMP DISABLE

Gates U6-B and U6-C generate a signal which turns off the lock lamp whenever a frequency of 990.0000 MHz or higher is selected (U6-C detects a 9 from U2-D and a 9 from U7-B), or when the 100's-of-MHz is not zero when in IF mode (U6-B detects IF mode and 0 from U9).

A3 (SYNTHESIZER) CONTROL LOGIC ASSEMBLY 39509



A3 (SYNTHESIZER) CONTROL LOGIC SCHEMATIC 39506R

A3 (SYNTHESIZER), CONTROL LOGIC PARTS LIST

REF.	DESCRIPTION	SD PART NO.
A3	Control Logic Assembly	39509B
A3	Control Logic Schematic	39506B
C1	Capacitor, 100 µF	C0832
C2	Capacitor, 39 µF, 10 V	C0902
CR1	Diode, 1N4151	CR0150
CR2	Diode, 1N4151	CR0150
Q1	Transistor, 2N3906	Q0248
Q2	Transistor, 2N3904	Q0247
Q3	Transistor, 2N3906	Q0248
Q4	Transistor, 2N3904	Q0247
Q5	Transistor, 2N3906	Q0248
Q6	Transistor, 2N3904	Q0247
Q7	Transistor, 2N3906	Q0248
Q8	Transistor, 2N3904	Q0247
Q9	Transistor, 2N3906	Q0248
Q10	Transistor, 2N3904	Q0247
Q11	Transistor, 2N3906	Q0248
Q12	Transistor, 2N3904	Q0247
Q13	Transistor, 2N3906	Q0248
Q14	Transistor, 2N3904	Q0247
Q15	Transistor, 2N3906	Q0248
Q16	Transistor, 2N3904	Q0247
Q17	Transistor, 2N3906	Q0248
Q18	Transistor, 2N3904	Q0247
Q19	Transistor, 2N3906	Q0248
Q20	Transistor, 2N3904	Q0247
Q21	Not Used	
Q22	Not Used	
Q23	Transistor, 2N3906	Q0248
Q24	Transistor, 2N3904	Q0247
R1	Resistor Network	27867
R2	Not Used	
R3	Not Used	
R4	Not Used	
R5	Resistor, 2.7 k, 1/4 W, 5%	R0937
R6	Resistor, 1.8 k, 1/4 W, 5%	R0959
R7	Resistor, 27 k, 1/4 W, 5%	R0824
R8	Resistor, 27 k, 1/4 W, 5%	R0824
R9	Resistor, 27 k, 1/4 W, 5%	R0824

A3 (SYNTHESIZER), CONTROL LOGIC PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R10	Not used	
R11	Resistor, 27 k, 1/4 W, 5%	R0824
R12	Resistor, 27 k, 1/4 W, 5%	R0824
R13	Resistor, 27 k, 1/4 W, 5%	R0824
R14	Resistor, 27 k, 1/4 W, 5%	R0824
R15	Resistor, 27 k, 1/4 W, 5%	R0824
R16	Resistor, 27 k, 1/4 W, 5%	R0824
R17	Resistor, 27 k, 1/4 W, 5%	R0824
R18	Not Used	
R19	Resistor, 27 k, 1/4 W, 5%	R0824
R20	Not Used	
R21	Resistor, 1.8 k, 1/4 W, 5%	R0959
R22	Resistor, 2.7 k, 1/4 W, 5%	R0937
R23	Resistor, 10 k, 1/4 W, 5%	R0766
R24	Resistor, 2.7 k, 1/4 W, 5%	R0937
R25	Resistor, 1.8 k, 1/4 W, 5%	R0959
U1	Integrated Circuit, SN7410N	19706
U2	Integrated Circuit, MC1808	25733
U3	Integrated Circuit, SN74H11N	25750
U4	Integrated Circuit, MC1808	25734
U5	Integrated Circuit, MC1808	25734
U6	Integrated Circuit, SN15846	19716
U7	Integrated Circuit, MC1810	25735
U8	Integrated Circuit, SN7483N	25738
U9	Integrated Circuit, SN7442	25749
U10	Integrated Circuit, SN7442	25749

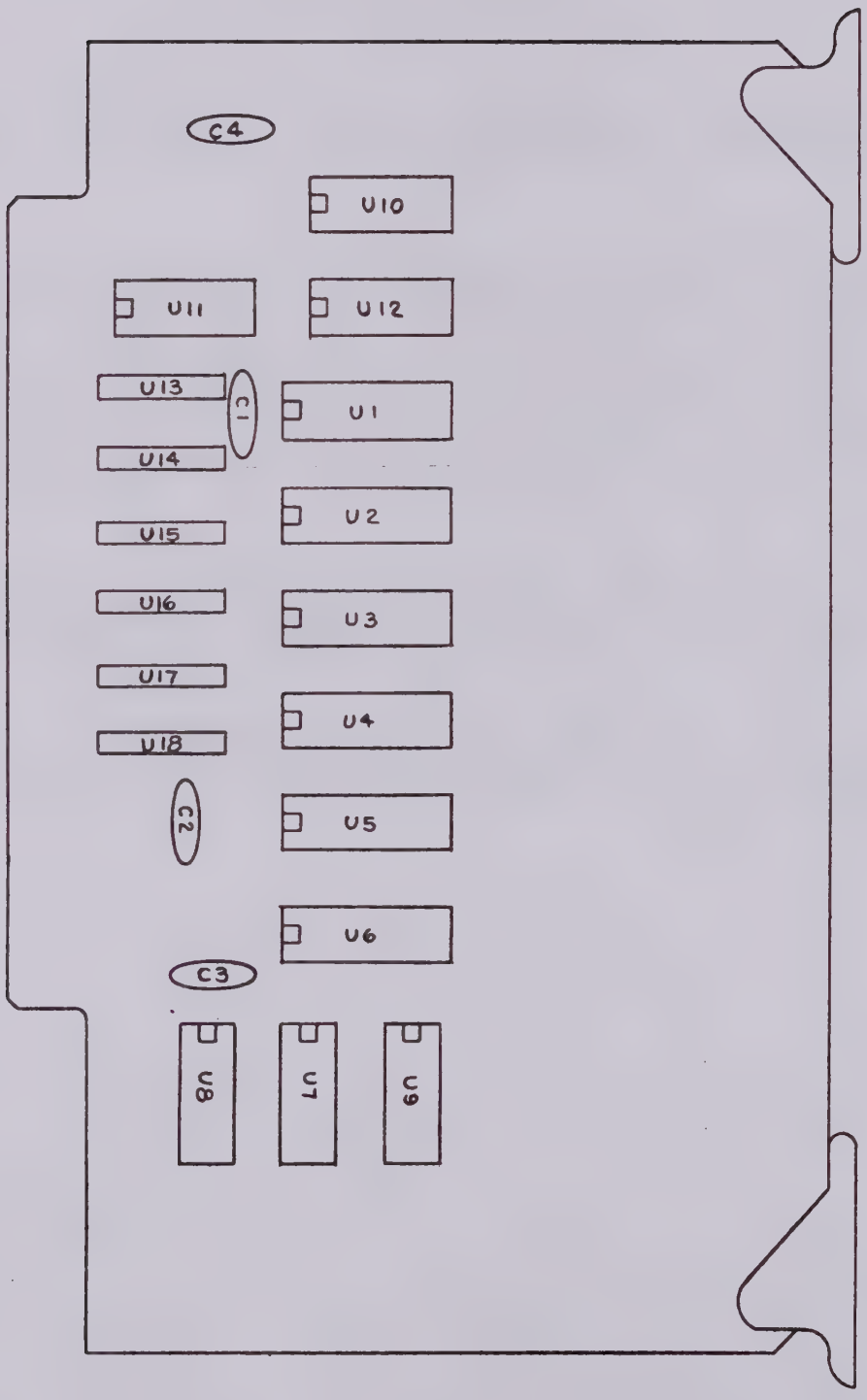
CIRCUIT DESCRIPTION
DIVIDE-BY-N BOARD
SCHEMATIC #7-04568001B
A6 (SYNTHESIZER)

The Divide-By-N Board is used to divide the RF board oscillator frequency by precisely the dialed-in number. In this way, an output pulse is generated every 100 milliseconds (10 Hz rate) when the loop is locked.

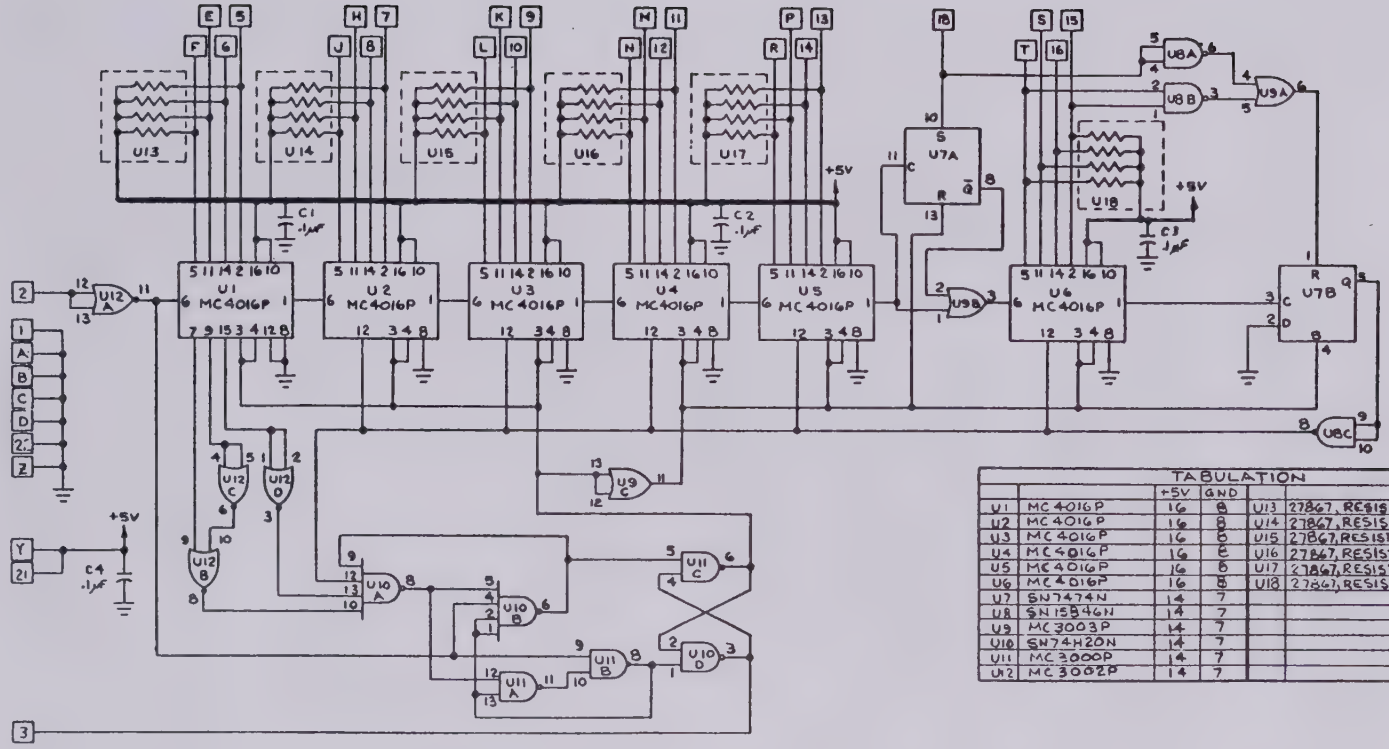
Integrated circuits U1-U6 are presettable decade counters which count down toward zero from the preset number. The output of each counter, except U1, plus the output from flip-flop U7-B are connected to a common line to detect a count of zero. The outputs from U1 are decoded by gates U12-B, C and D to detect a count of two. The resulting outputs from U12-B and U12-D, plus the signal existing on the zero-detect line, and the input clock pulse, via input 3 of U10-A, enable flip-flop U11-C and U11-D to produce a reset pulse for the decade counters. This reset pulse ends when the next input clock pulse is initiated.

Flip-flop U7-A and gate U9-B are used to make the oscillator run 10 MHz higher than the dialed-in number when operating in any mode except the IF. Flip-flop U7-A keeps gate U9-B closed, blocking any count-pulses from U6. After the first succeeding count-pulse from U5, gate U9-B is allowed to pass the remaining count-pulses to U6.

Flip-flop U7-B is the final element in the count chain. It is preset to a zero output if the dialed-in frequency is below 100 MHz via U8-A. For settings over 100 MHz, it is preset to a one via U8-B; it then counts down to zero.



A6 (SYNTHESIZER), DIVIDE-BY-N ASSEMBLY 04568001



TABULATION

		+5V	GND		
U1	MC4016P	16	8	U13	27867, RESISTOR PACK, 4.7K
U2	MC4016P	16	8	U14	27867, RESISTOR PACK, 4.7K
U3	MC4016P	16	8	U15	27867, RESISTOR PACK, 4.7K
U4	MC4016P	16	8	U16	27867, RESISTOR PACK, 4.7K
U5	MC4016P	16	8	U17	27867, RESISTOR PACK, 4.7K
U6	MC4016P	16	8	U18	27867, RESISTOR PACK, 4.7K
U7	SN7474N	14	7		
U8	SN15846N	14	7		
U9	MC3003P	14	7		
U10	SN74H20N	14	7		
U11	MC3000P	14	7		
U12	MC3002P	14	7		

A6 (SYNTHESIZER), DIVIDE-BY-N SCHEMATIC 7-04568001

A6 (SYNTHESIZER) DIVIDE-BY-N PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Divide-By-N Assembly	04568001B
	Divide-By-N Schematic	7-04568001B
C1	Capacitor, .1 µF, 10 V, Disc	C0661
C2	Capacitor, .1 µF, 10 V, Disc	C0661
C3	Capacitor, .1 µF, 10 V, Disc	C0661
C4	Capacitor, .1 µF, 10 V, Disc	C0661
U1	Integrated Circuit, MC4016P	045237
U2	Integrated Circuit, MC4016P	045237
U3	Integrated Circuit, MC4016P	045237
U4	Integrated Circuit, MC4016P	045237
U5	Integrated Circuit, MC4016P	045237
U6	Integrated Circuit, MC4016P	045237
U7	Integrated Circuit, SN7474N	025241
U8	Integrated Circuit, SN15846N	019716
U9	Integrated Circuit, MC3003P	025767
U10	Integrated Circuit, SN741H120N	045234
U11	Integrated Circuit, MC3000P	025766
U12	Integrated Circuit, MC3002P	025739
U13	Resistor Network, 4.7 k	027867
U14	Resistor Network, 4.7 k	027867
U15	Resistor Network, 4.7 k	027867
U16	Resistor Network, 4.7 k	027867
U17	Resistor Network, 4.7 k	027867
U18	Resistor Network, 4.7 k	027867

CIRCUIT DESCRIPTION
PHASE DETECTOR BOARD
SCHEMATIC 45545E
A8 (SYNTHESIZER)

The Phase Detector Board contains circuitry to compare the phase of the divided-down RF oscillator with that of the divided-down 1 MHz reference. The resulting control voltage is used to maintain the oscillator on frequency. A more detailed description of the complete control loop is given in this section.

A complex slope ramp is generated by R22, C11, R23, and C12. This ramp is such that the rate of voltage increase is in itself increasing. This function coarsely approximates an exponential curve. Amplifier U5 provides a gain of approximately 3 with a high-impedance input to avoid loading the ramp generator. The output impedance is very low to permit the first sampling capacitor to charge rapidly.

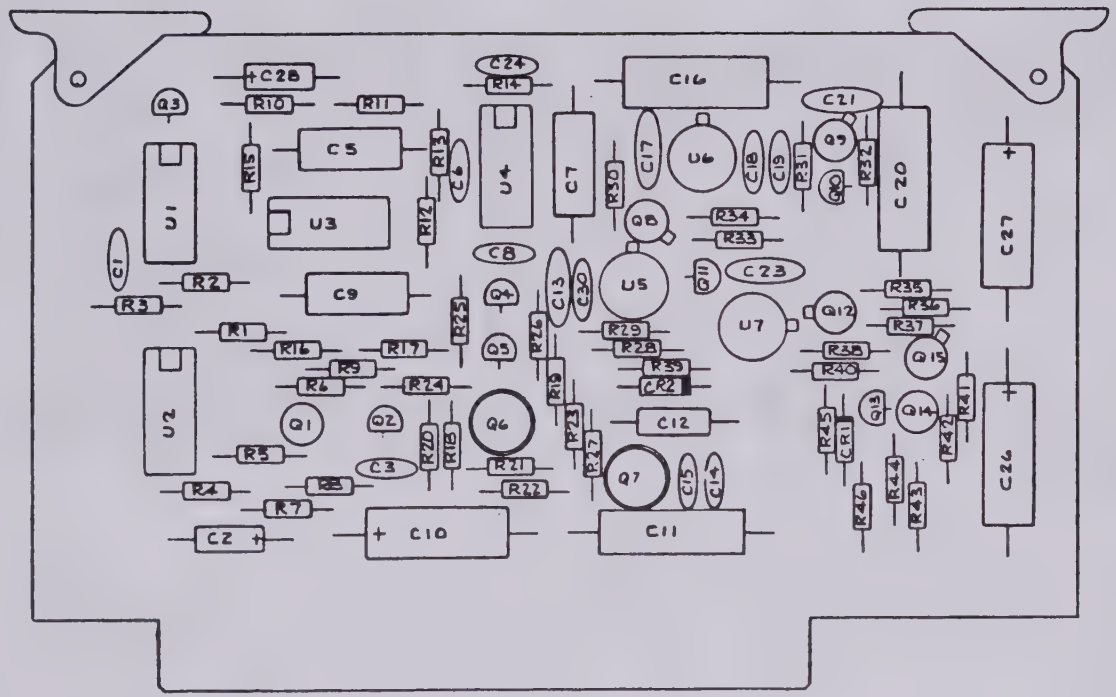
To generate the sampling pulses, the output from the Divide-by-N board (at 10 Hz) is used to trigger a one-shot pulse generator, U3-A and U3-B. This is sample pulse #1. Gate U4-A provides the proper polarity signal to drive delay one-shot U4-B and U4-C. This circuit provides a time delay between sample pulses. The output of the delay one-shot triggers the second one-shot generator. U3-C and U3-D generate the second sampling pulse. Each sampling pulse is converted from 5 V logic levels to a signal which is normally at -5 V and goes to an open circuit during the sample. Internal transistors Q4 and Q5 shift pulse #1; Q10 and Q11 shift pulse #2.

When the gate of FET Q8 is released from -5 V by the first sampling pulse, it is turned on via R30. Capacitor C16 now charges rapidly to the ramp voltage-level present. When the sample pulse ends, the gate returns to -5 V and Q8 turns off. Since the off resistance of Q8 and the input impedance of U6 are high, C16 holds the voltage it had at the end of the sample time. The decay in the voltage is slow enough that only a small fraction has been lost when the next sample pulse arrives. The delayed sample pulse #2 operates FET Q9 in the same way pulse #1 operated Q8. Amplifier U6 has a gain of 1 and simply provides a high-impedance load for C16 and a low-impedance source to drive C20. C20 will charge rapidly to the same voltage as C16 during the second sampling interval. Capacitor C21 is used to cancel transients produced by switching Q9.

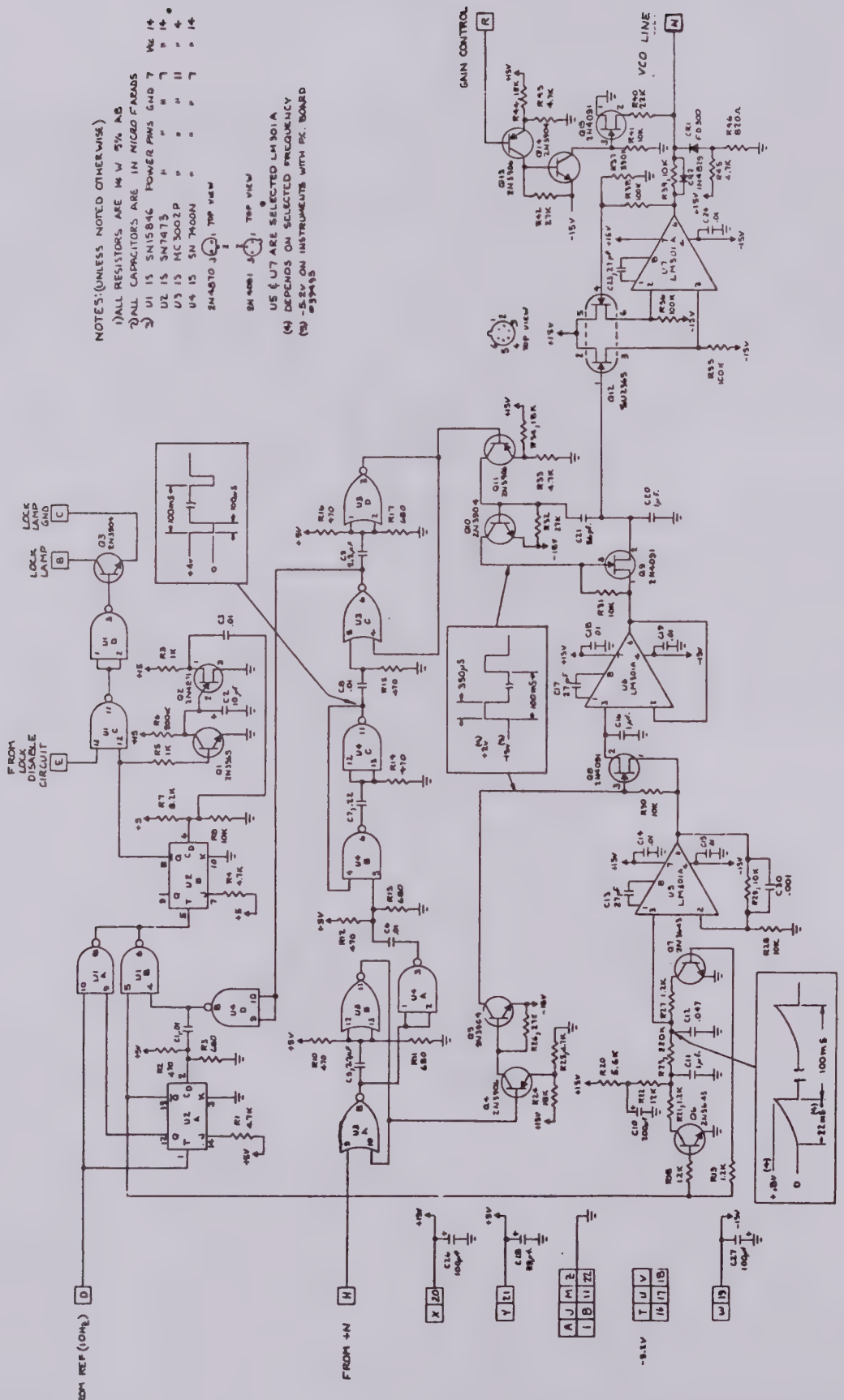
The output of U3-C, inverted by U4-D, is used to reset control flip-flop U2-A. This causes the $\overline{Q}$ output to go high (+5 V) thereby turning on transistors Q6 and Q7. With Q6 and Q7 on, the ramp capacitors are discharged to ground through R21 and R27, stopping the ramp. The next negative-going transition of the 10 Hz reference causes U2-A to switch states, the $\overline{Q}$ output goes low, Q6 and Q7 turn off, and the ramp starts upward from zero. The cycle is complete.

Gates U1-A and U1-B are used to detect an "out-of-lock" condition. This is done by detecting the presence of second pulse (or negative transition) from one of the 10 Hz inputs prior to the other input producing a pulse. For example, two successive pulses from the divide-by-N 10 Hz signal with no intervening negative-going transition from the 10 Hz reference will cause U1-A to go low. This transition causes the $\overline{Q}$ output of U2-B to go low. The output of U1-C now goes high, U1-D goes low, Q3 turns off, and the front-panel lock-lamp goes out. The low output from U2-B also turns off transistor Q1, starting timer Q2. This timer holds the lamp off for about .1 second, then resets U2-B. If the out-of-lock condition persists, the lamp will blink on and off. The other input to U1-C is used to turn off the lock-lamp for two conditions. One is a dialed-in frequency exceeding 989.9999 MHz in RCVR, CW, or FM Mode. The other is when any digit, other than zero, is set into the highest dial when in IF Mode.

The second sampling capacitor, C20 is connected to amplifier U7 via the dual FET Q12. The amplifier provides a gain of two, the FET pair gives a very high input impedance with low leakage. Q15 is used as a switch to allow attenuation of the output voltage when operating in the lower end of the oscillator ranges. This improves loop stability. The switch is controlled automatically by a logic level signal on Pin R. Q13 and Q14 provide proper levels to control Q15. Diode CR1 and bias network R45 and R46 are used to prevent the output voltage from dropping below about 1 volt. This ensures that the oscillator control diodes will never be forward-biased.



A8 (SYNTHESIZER), PHASE DETECTOR P.C. ASSEMBLY 45548


NOTES: (UNLESS NOTED OTHERWISE)
1) ALL RESISTORS ARE ¼ W 5% AB
2) ALL CAPACITORS ARE IN MICRO FARADS
3) U1 IS SN15846 POWER PINS GND 7 Vcc 14
U2 IS SN7473 " " " 7 " 14
U3 IS MC3002P " " " 11 " 4
U4 IS SN 7400N " " " 7 " 14
SN4510 J1 TOP VIEW
SN 4081 J2 TOP VIEW
U5 & U7 ARE SELECTED LM301A
(4) DEPENDS ON SELECTED FREQUENCY
(5) -5.2V ON INSTRUMENTS WITH PC BOARD #39495
GAIN CONTROL
VCO LINE
LOCK LAMP
LOCK LAMP GND
FROM LOCK DISABLE CIRCUIT
FROM REF (10MHz)
FROM +N
-5.2V
100mS
22mS
350µS
100mS

A8 (SYNTHESIZER), PHASE DETECTOR SCHEMATIC 45545

A8 (SYNTHESIZER), PHASE DETECTOR PARTS LIST

REF.	DESCRIPTION	SD PART NO.
A8	Phase Detector Assembly	45548E
A8	Phase Detector Schematic	45545E
C1	Capacitor, .01 µF, Disc	C0562
C2	Capacitor, 10 µF, Tant	C0353
C3	Capacitor, .01 µF, Disc	C0562
C4	Not Used	
C5	Capacitor, 1 µF, 50 V, Paper	03279390
C6	Capacitor, .01 µF, Disc	C0562
C7	Capacitor, .22 µF, Mylar	03278830
C8	Capacitor, .01 µF, Disc	C0562
C9	Capacitor, 1 µF, 50 V, Paper	03279390
C10	Capacitor, 100 µF, Electro	C0832
C11	Capacitor, 1 µF	C0314
C12	Capacitor, .1 µF, 200 V	C0382
C13	Capacitor, 27 pF, DM	C0530
C14	Capacitor, .01 µF, Disc	C0562
C15	Capacitor, .01 µF, Disc	C0562
C16	Capacitor, 1 µF	C0314
C17	Capacitor, 27 pF, DM	C0530
C18	Capacitor, .01 µF, Disc	C0562
C19	Capacitor, .01 µF, Disc	C0562
C20	Capacitor, 1 µF	C0314
C21	Capacitor, 56 pF, DM	C0534
C22	Not Used	
C23	Capacitor, 27 pF, DM	C0530
C24	Capacitor, .01 µF, Disc	C0562
C25	Not Used	
C26	Capacitor, 100 µF, Electro	C0832
C27	Capacitor, 100 µF, Electro	C0832
C28	Capacitor, 39 µF, Tant	C0902
C29	Capacitor, 39 µF, Tant	C0902
CR1	Diode, FD300	26012320
Q1	Transistor, 2N3565	Q0237
Q2	Transistor, FET 2N4871	Q0266
Q3	Transistor, 2N3904	Q0247
Q4	Transistor, 2N3906	Q0248
Q5	Transistor, 2N3646	Q0218
Q6	Transistor, 2N3643	Q0179
Q7	Transistor, 2N3643	Q0179

A8 (SYNTHESIZER), PHASE DETECTOR PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
Q8	Transistor, FET 2N4093	Q0301
Q9	Transistor, FET 2N4093	Q0301
Q10	Transistor, 2N3646	Q0218
Q11	Transistor, 2N3906	Q0248
Q12	Transistor, Dual FET 2N3958	26015100
Q13	Transistor, 2N3906	Q0248
Q14	Transistor, 2N3646	Q0218
Q15	Transistor, FET 2N4093	Q0301
R1	Resistor, 4.7 k, 1/4 W, 5%	R0892
R2	Resistor, 470 Ω, 1/4 W, 5%	R1044
R3	Resistor, 680 Ω, 1/4 W, 5%	R1234
R4	Resistor, 4.7 k, 1/4 W, 5%	R0892
R5	Resistor, 1 k, 1/4 W, 5%	R0765
R6	Resistor, 200 k, 1/4 W, 5%	R0823
R7	Resistor, 8.2 k, 1/4 W, 5%	R0883
R8	Resistor, 10 k, 1/4 W, 5%	R0766
R9	Resistor, 1 k, 1/4 W, 5%	R0765
R10	Resistor, 470 Ω, 1/4 W, 5%	R1044
R11	Resistor, 680 Ω, 1/4 W, 5%	R1234
R12	Resistor, 470 Ω, 1/4 W, 5%	R1044
R13	Resistor, 680 Ω, 1/4 W, 5%	R1234
R14	Resistor, 470 Ω, 1/4 W, 5%	R1044
R15	Resistor, 470 Ω, 1/4 W, 5%	R1044
R16	Resistor, 470 Ω, 1/4 W, 5%	R1044
R17	Resistor, 680 Ω, 1/4 W, 5%	R1234
R18	Resistor, 1.2 k, 1/4 W, 5%	R0809
R19	Resistor, 1.2 k, 1/4 W, 5%	R0809
R20	Resistor, 100 Ω, 1/4 W, 5%	R0966
R21	Resistor, 1.2 k, 1/4 W, 5%	R0809
R22	Resistor, 27 k, 1/4 W, 5%	R0824
R23	Resistor, 1.2 M, 1/4 W, 5%	R1299
R24	Resistor, 18 k, 1/4 W, 5%	R0785
R25	Resistor, 4.7 k, 1/4 W, 5%	R0892
R26	Resistor, 27 k, 1/4 W, 5%	R0824
R27	Resistor, 1.2 k, 1/4 W, 5%	R0809
R28	Resistor, 10 k, 1/4 W, 5%	R0766
R29	Resistor, 22 k, 1/4 W, 5%	R0768
R30	Resistor, 10 k, 1/4 W, 5%	R0766
R31	Resistor, 10 k, 1/4 W, 5%	R0766
R32	Resistor, 27 k, 1/4 W, 5%	R0824

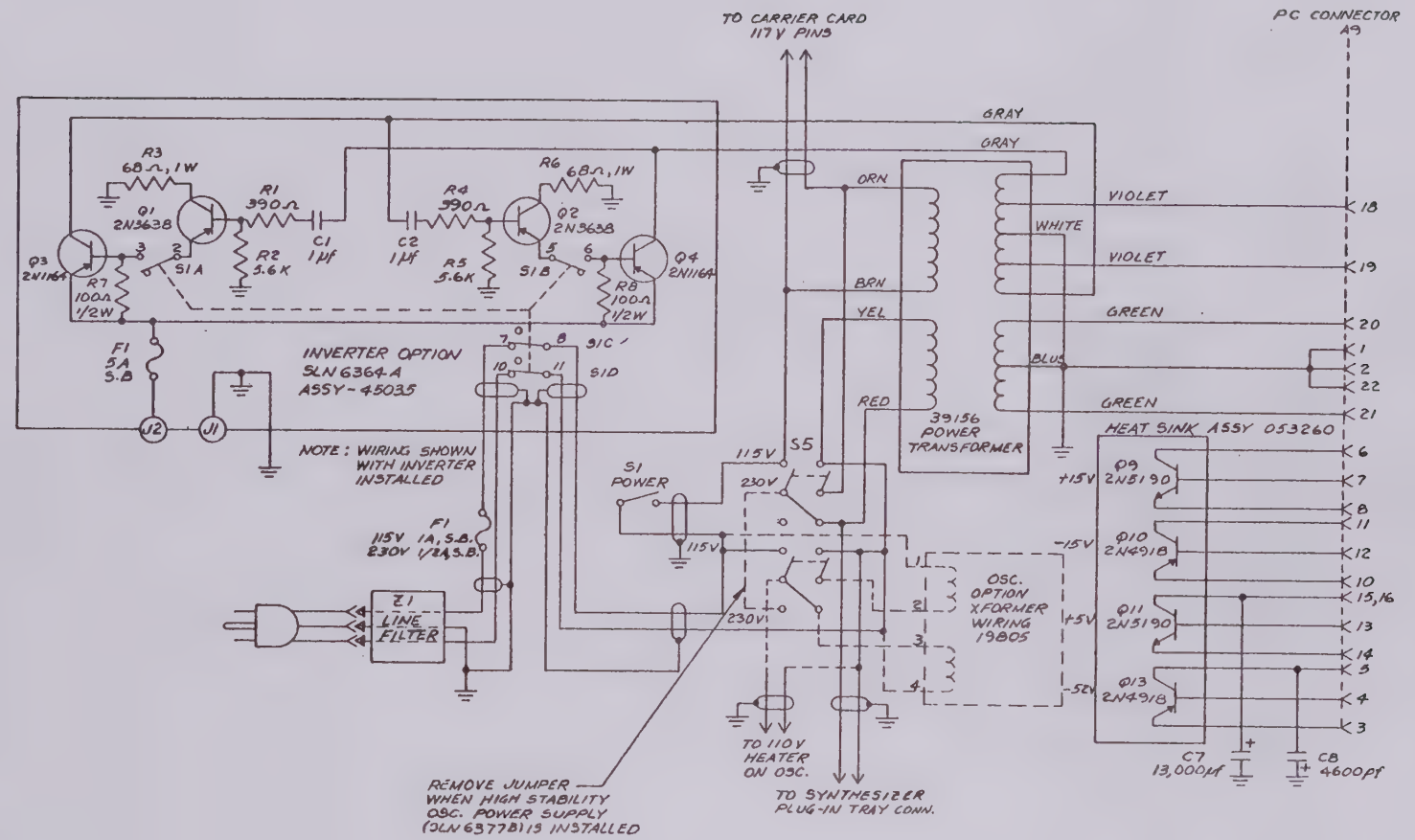
A8 (SYNTHESIZER), PHASE DETECTOR PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R33	Resistor, 4.7 k, 1/4 W, 5%	R0892
R34	Resistor, 18 k, 1/4 W, 5%	R0785
R35	Resistor, 12 k, 1/4 W, 5%	R0759
R36	Resistor, 12 k, 1/4 W, 5%	R0759
R37	Resistor, 10 k, 1/4 W, 5%	R0766
R38	Resistor, 10 k, 1/4 W, 5%	R0766
R39	Resistor, 10 k, 1/4 W, 5%	R0766
R40	Resistor, 22 k, 1/4 W, 5%	R0768
R41	Resistor, 10 k, 1/4 W, 5%	R0766
R42	Resistor, 27 k, 1/4 W, 5%	R0824
R43	Resistor, 4.7 k, 1/4 W, 5%	R0892
R44	Resistor, 18 k, 1/4 W, 5%	R0785
R45	Resistor, 4.7 k, 1/4 W, 5%	R0892
R46	Resistor, 820 Ω, 1/4 W, 5%	R0762
U1	Integrated Circuit, SN15846N	19716
U2	Integrated Circuit, SN7473N	19709
U3	Integrated Circuit, MC3002P	25739
U4	Integrated Circuit, SN7400N	19705
U5	Integrated Circuit, LM301A	25745
U6	Integrated Circuit, LM301A	25745
U7	Integrated Circuit, LM301A	25745

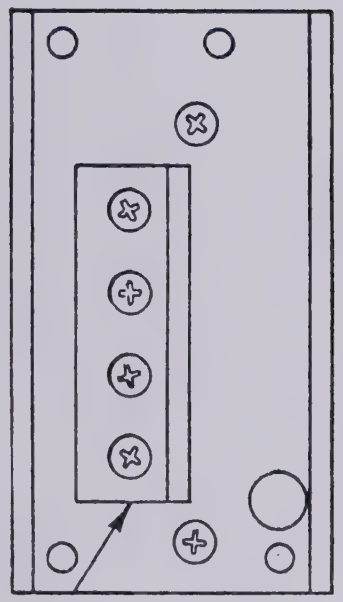
CIRCUIT DESCRIPTION
POWER SUPPLY
SCHEMATIC #7-05352101A
(SYNTHESIZER)

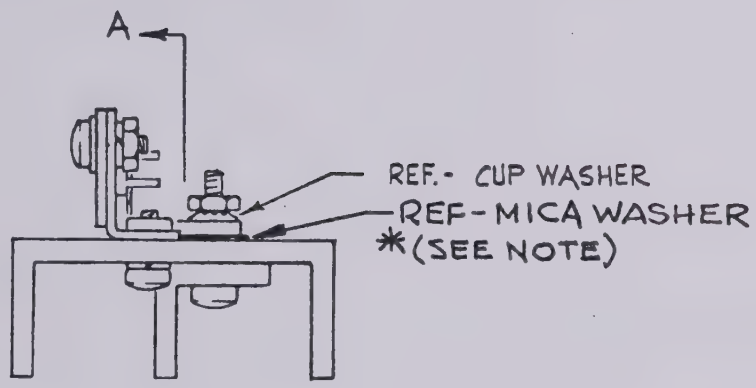
The Power Supply consists of a transformer, a plug-in card containing the rectifier diodes and regulator circuits, and rear-panel series-pass transistors for the regulators.

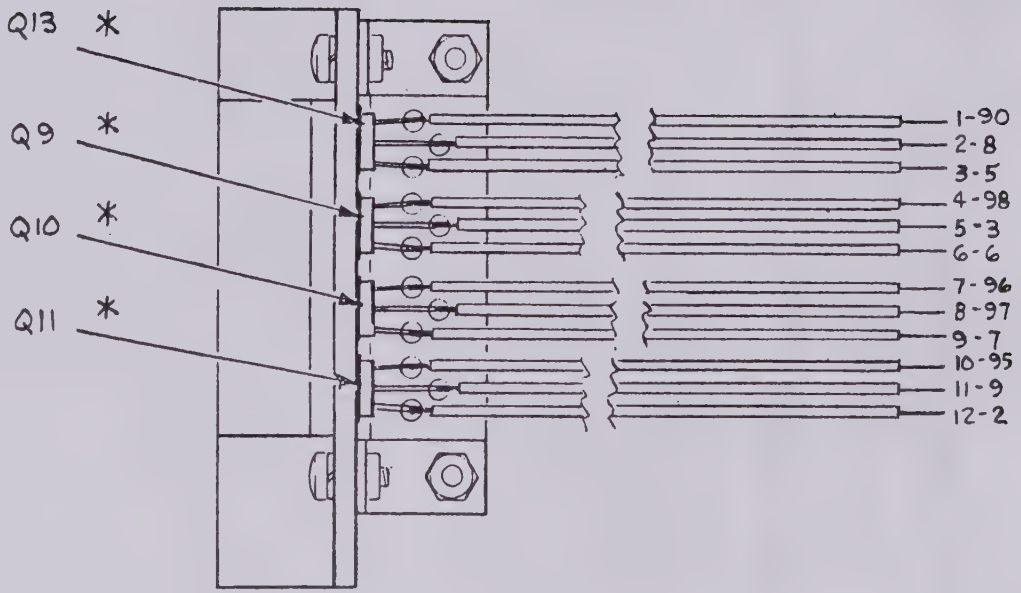
Line voltage selection is accomplished via a rear-panel-mounted switch. This switch selects the applicable line voltage for the main power supply and the high-stability oscillator (when used). The printed-circuit board mounted on the power transformer has an edge-connector which provides power and interconnects to the Monitor section.



(SYNTHESIZER) POWER SUPPLY SCHEMATIC 05352101







VIEW A-A

(SYNTHESIZER), POWER SUPPLY HEAT SINK ASSEMBLY 053260

(SYNTHESIZER) POWER SUPPLY HEAT SINK ASSEMBLY PARTS LIST

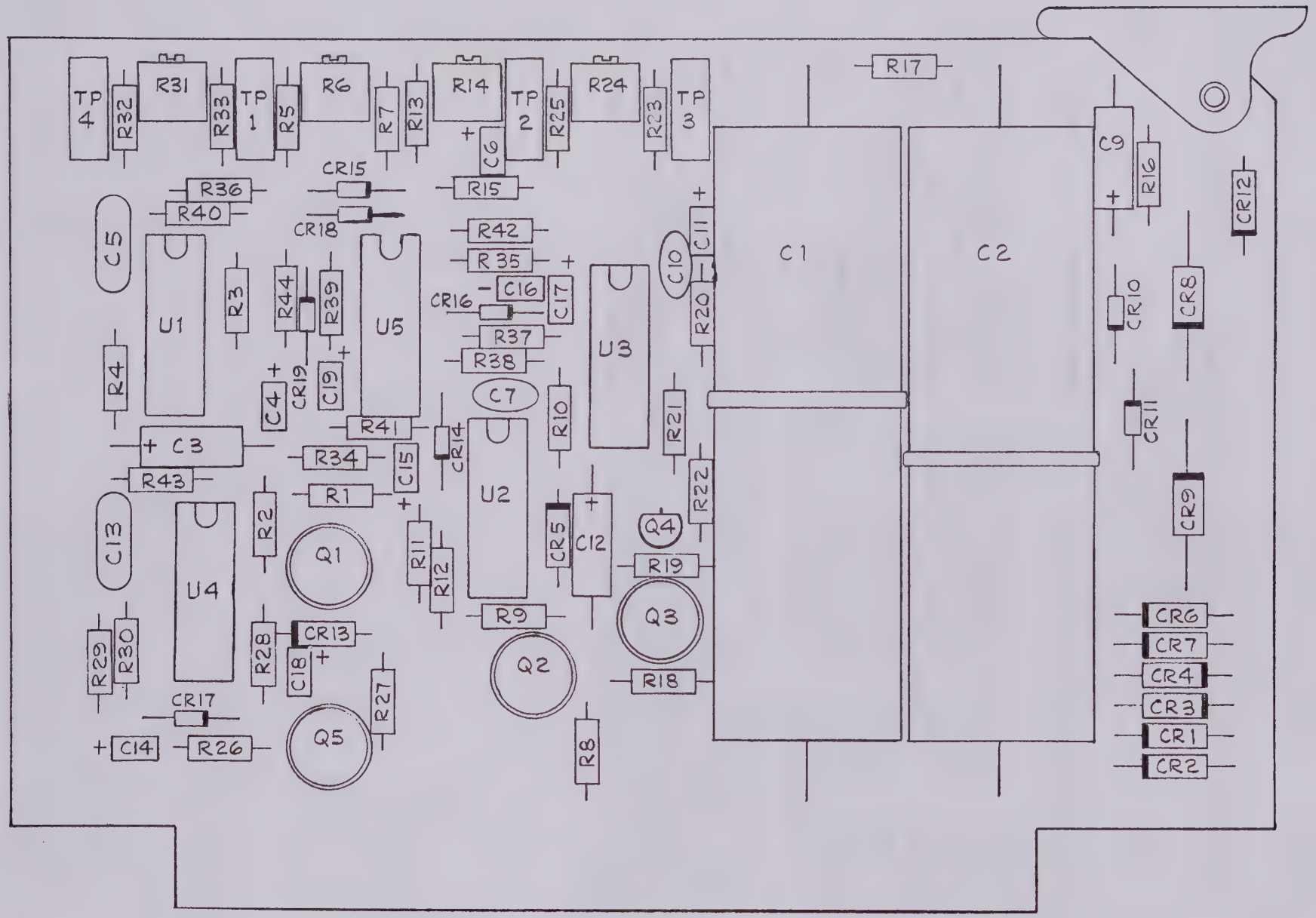
REF.	DESCRIPTION	SD PART NO.
	Power Supply Heat Sink Assembly	053260C
	Heat Sink	053208A
Q9	Transistor 2N5190	Q0281
Q10	Transistor 2N4918	Q0268
Q11	Transistor 2N5190	Q0281
Q12	Not Used	
Q13	Transistor 2N4918	Q0268

CIRCUIT DESCRIPTION
POWER SUPPLY REGULATOR
SCHEMATIC #39514D
A9 (SYNTHESIZER)

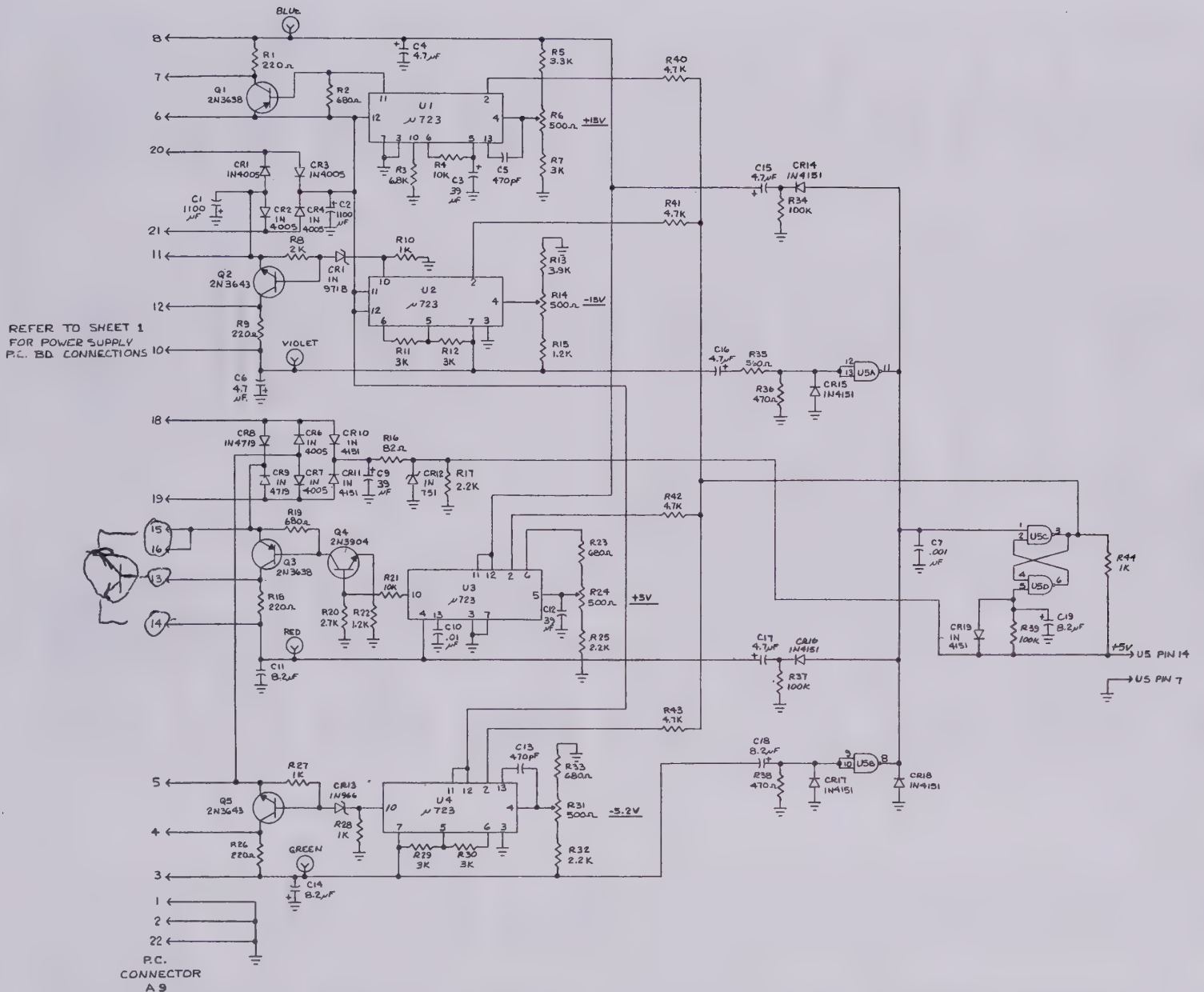
This circuit regulates the critical dc voltages necessary to operate the Service Monitor.

Voltage from the split-primary transformer is fed to four full-wave rectifiers on the plug-in regulator card. Diodes CR1 and CR2 provide the -21 V unregulated supply (filtered by C11 on the board); diodes CR3 and CR4, the +21 V (filter C10 on the board); CR6 and CR7, the -9 V (filter C8 off the board); and CR8 and CR9, the +9 V (filter C9 off the board). The regulated +15 volts is derived from the +21 V supply. Integrated circuit regulator U1, with adjustment R4 and series-pass transistor Q9, comprise the +15 V regulator. U2, R8, Q10 and Q1 provide -15 volts. The remaining two regulated supplies, +5 V and -5 V, are produced in a similar manner.

A short-circuit protection network has been incorporated into the power supply regulator. Four capacitive-coupling circuits sense when any of the supplies drop to zero(short circuit, for example). This causes all four supplies to instantly turn off. The supplies will remain off (although the power lights and meter lights stay on) until the main power switch has been turned off, then reenergized. This resets the protective network and power is reapplied to the instrument circuits.



A9 (SYNTHESIZER), POWER SUPPLY REGULATOR P.C. ASSEMBLY 39513



A9 (SYNTHESIZER), POWER SUPPLY REGULATOR P.C. SCHEMATIC 39514

A9 (SYNTHESIZER), POWER SUPPLY REGULATOR PARTS LIST

REF.	DESCRIPTION	SD PART NO.
A9	Power Supply Assembly	39513F
A9	Power Supply Schematic	39514D
C1	Capacitor, 1100 µF, 30 V	C1162
C2	Capacitor, 1100 µF, 30 V	C1162
C3	Capacitor, 39 µF, 10 V	C0902
C4	Capacitor, 4.7 µF, 25 V	03287820
C5	Capacitor, 470 pF, DM	C0542
C6	Capacitor, 4.7 µF, 25 V	03287820
C7	Capacitor, .001 µF, Disc	C0424
C8	Not Used	
C9	Capacitor, 39 µF, 10 V	C0902
C10	Capacitor, .01 µF, Disc	C0562
C11	Capacitor, 8.2 µF, 15 V	03287360
C12	Capacitor, 39 µF, 10 V	C0902
C13	Capacitor, 470 pF, DM	C0542
C14	Capacitor, 8.2 µF, 15 V	03287360
C15	Capacitor, 4.7 µF, 25 V	03287820
C16	Capacitor, 4.7 µF, 25 V	03287820
C17	Capacitor, 4.7 µF, 25 V	03287820
C18	Capacitor, 8.2 µF, 15 V	03287360
C19	Capacitor, 8.2 µF, 15 V	03287360
CR1	Diode, 1N4005	CR0284
CR2	Diode, 1N4005	CR0284
CR3	Diode, 1N4005	CR0284
CR4	Diode, 1N4005	CR0284
CR5	Diode, 1N971B	CR0229
CR6	Diode, 1N4005	CR0284
CR7	Diode, 1N4005	CR0284
CR8	Diode, 1N4719	CR0251
CR9	Diode, 1N4719	CR0251
CR10	Diode, 1N4151	CR0150
CR11	Diode, 1N4151	CR0150
CR12	Diode, 1N751	CR0198
CR13	Not Used	
CR14	Diode, 1N4151	CR0150
CR15	Diode, 1N4151	CR0150
CR16	Diode, 1N4151	CR0150
CR17	Diode, 1N4151	CR0150
CR18	Diode, 1N4151	CR0150
CR19	Diode, 1N4151	CR0150

A9 (SYNTHESIZER), POWER SUPPLY REGULATOR PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
Q1	Transistor, 2N3638	Q0181
Q2	Transistor, 2N3643	Q0179
Q3	Transistor, 2N3638	Q0181
Q4	Transistor, 2N3904	Q0247
Q5	Transistor, 2N3643	Q0179
R1	Resistor, 220 Ω, 1/4 W, 5%	R0760
R2	Resistor, 680 Ω, 1/4 W, 5%	R1234
R3	Resistor, 6.8 k, 1/4 W, 5%	R0696
R4	Resistor, 10 k, 1/4 W, 5%	R0766
R5	Resistor, 3.3 k, 1/4 W, 5%	R0742
R6	Resistor, 500 Ω, Potentiometer, 1 Turn	R2448
R7	Resistor, 3 k, 1/4 W, 5%, CC	R0711
R8	Resistor, 2 k, 1/4 W, 5%, CC	R0734
R9	Resistor, 220 Ω, 1/4 W, 5%	R0760
R10	Resistor, 1 k, 1/4 W, 5%	R0765
R11	Resistor, 3 k, 1/4 W, 5%, CC	R0711
R12	Resistor, 3 k, 1/4 W, 5%, CC	R0711
R13	Resistor, 3.9 k, 1/4 W, 5%	R0939
R14	Resistor, 500 Ω, Potentiometer, 1 Turn	R2448
R15	Resistor, 1.2 k, 1/4 W, 5%	R0809
R16	Resistor, 82 Ω, 1/4 W, 5%	R1059
R17	Resistor, 2.2 k, 1/4 W, 5%	R0749
R18	Resistor, 220 Ω, 1/4 W, 5%	R0760
R19	Resistor, 680 Ω, 1/4 W, 5%	R1234
R20	Resistor, 2.7 k, 1/4 W, 5%	R0937
R21	Resistor, 10 k, 1/4 W, 5%	R0766
R22	Resistor, 1.2 k, 1/4 W, 5%	R0809
R23	Resistor, 680 Ω, 1/4 W, 5%	R1234
R24	Resistor, 500 Ω, Potentiometer, 1 Turn	R2448
R25	Resistor, 2.2 k, 1/4 W, 5%	R0749
R26	Resistor, 220 Ω, 1/4 W, 5%	R0760
R27	Resistor, 1 k, 1/4 W, 5%	R0765
R28	Resistor, 1 k, 1/4 W, 5%	R0765
R29	Resistor, 3 k, 1/4 W, 5%, CC	R0711
R30	Resistor, 3 k, 1/4 W, 5%, CC	R0711
R31	Resistor, 500 Ω, Potentiometer, 1 Turn	R2448
R32	Resistor, 2.2 k, 1/4 W, 5%	R0749
R33	Resistor, 680 Ω, 1/4 W, 5%	R1234
R34	Resistor, 100 k, 1/4 W, 5%	R0741
R35	Resistor, 560 Ω, 1/4 W, 5%	R0819

A9 (SYNTHESIZER), POWER SUPPLY REGULATOR PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R36	Resistor, 470 Ω, 1/4 W, 5%	R1044
R37	Resistor, 100 k, 1/4 W, 5%	R0741
R38	Resistor, 470 Ω, 1/4 W, 5%	R1044
R39	Resistor, 100 k, 1/4 W, 5%	R0741
R40	Resistor, 4.7 k, 1/4 W, 5%	R0892
R41	Resistor, 4.7 k, 1/4 W, 5%	R0892
R42	Resistor, 4.7 k, 1/4 W, 5%	R0892
R43	Resistor, 4.7 k, 1/4 W, 5%	R0892
R44	Resistor, 1 k, 1/4 W, 5%	R0765
U1	Integrated Circuit, µ723C	25761
U2	Integrated Circuit, µ723C	25761
U3	Integrated Circuit, µ723C	25761
U4	Integrated Circuit, µ723C	25761
U5	Integrated Circuit, MC846P	19716
TP1	Test Point, Blue	09063160
TP2	Test Point, Violet	E0241
TP3	Test Point, Red	E0236
TP4	Test Point, Green	E0239

CIRCUIT DESCRIPTION
VCO BOARD
SCHEMATIC #7-05327401A
A11 (SYNTHESIZER)

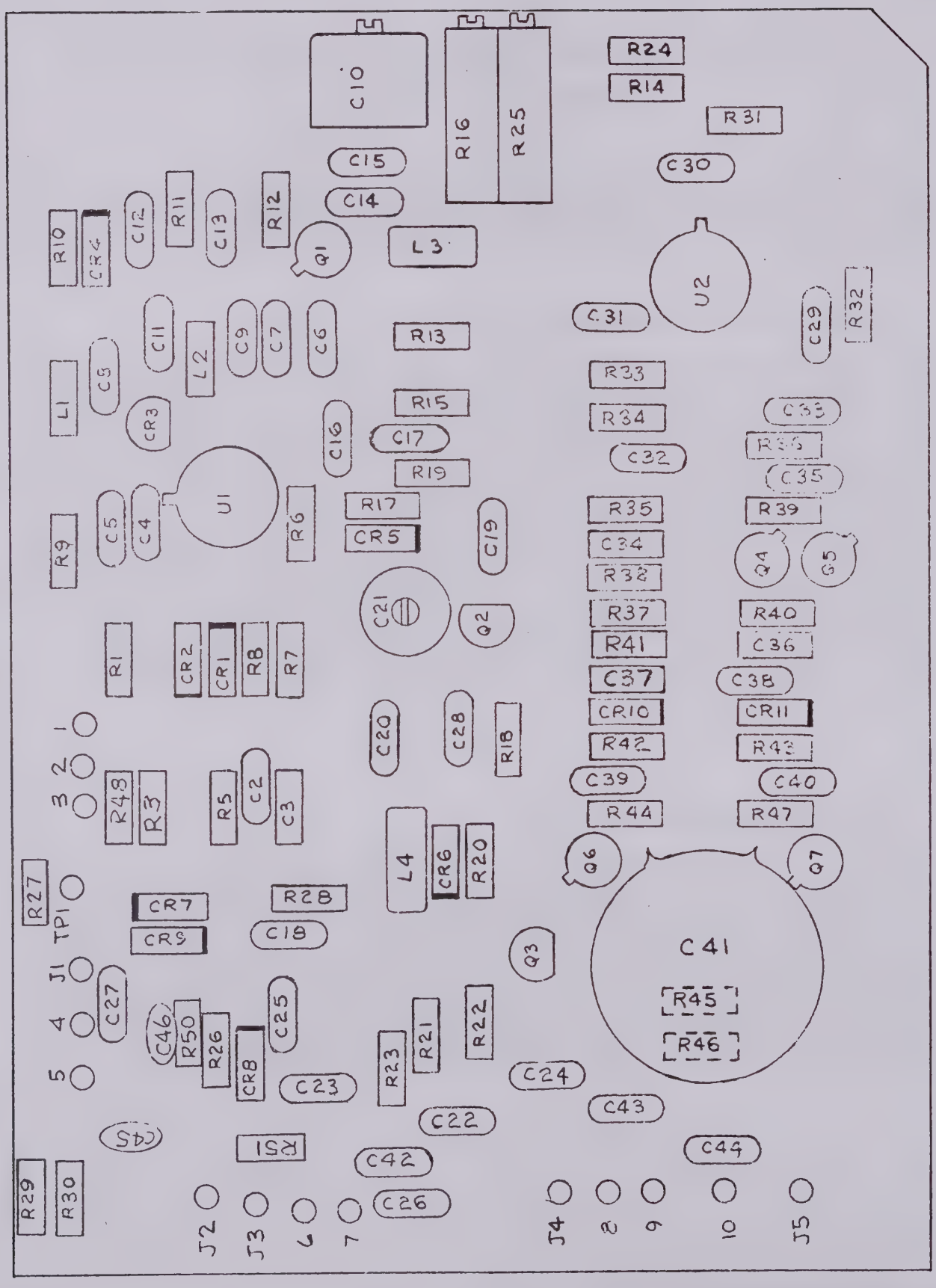
The VCO board consists of two basic circuits. The first is a 10 MHz voltage-controlled oscillator (VCO) which produces a frequency-modulated signal. The second is an untuned wideband amplifier for the IF mode.

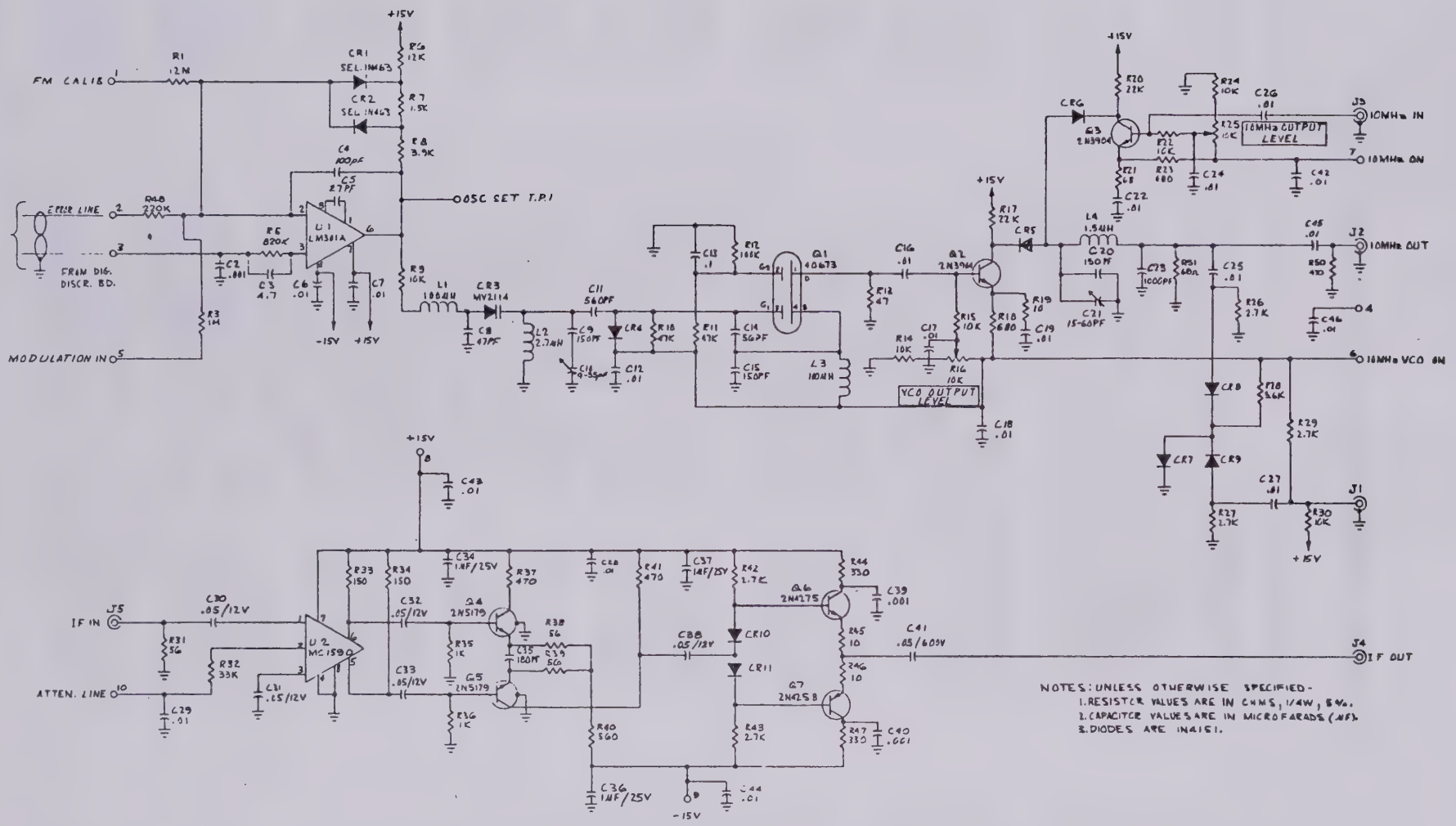
1) 10 MHz VCO AND 10 MHz SWITCHING

The 10 MHz VCO consists of oscillator Q1, a dual-insulated-gate MOS-type transistor, RF-tuned amplifier Q2, and control-voltage amplifier U1. The FM CALIB voltage input from the FM CAL potentiometer (front panel), the feedback voltage from the Discriminator circuit in the Monitor section, and the modulation input signal are summed up in control-voltage amplifier U1. The resulting output is applied to voltage-variable capacitor CR3. This voltage-variable capacitor, together with inductor L2,capacitor C9 and trimmer C10, control the oscillator frequency. Feedback and bias for the oscillator are supplied by C14, C15, and L3. The tuned amplifier circuit, which consists of Q2, L4, C20 and trimmer C21, is used to both amplify and isolate the oscillator output; also, the amplifier acts as an on/off switch (through application of the "10 MHz VCO ON" signal) for the "10 MHz OUT" signal. Amplifier Q3 controls (through the "10 MHz ON" signal) the supply of the fixed "10 MHz IN" to connector J2.

2) WIDE BAND, UNTUNED AMPLIFIER

The final circuit on this board is a wideband, untuned amplifier used to provide the high-level IF OUT signal. A variable-voltage from the front panel "IF ATTEN. LINE" determines the amplitude of the signal at the input of integrated-circuit amplifier U2. U2, together with ac-coupled, untuned amplifier Q4 and Q5, provide the required amplification for the IF signals; the amplitude of this output voltage is controlled via the AGC within integrated circuit U2. Transistors Q6 and Q7, connected in a complementary-symmetry emitter-follower configuration, provide a low-output impedance drive capability.


A11 (SYNTHESIZER), VCO BOARD ASSEMBLY 05327401
C10
R16
R25
R24
R14
R31
C30
C15
C14
L3
R10
CR4
C12
R11
C13
R12
Q1
U2
C31
C29
R32
C11
C9
C7
C6
L2
L1
C5
R13
R33
R34
C33
R36
C32
C35
R15
C16
C17
R19
R17
CR3
U1
R6
C5
C4
R9
CR5
C19
R35
R39
C34
Q4
Q5
R38
C21
Q2
R37
R40
R41
C36
R1
CR2
CR1
R8
R7
C37
C38
CR10
CR11
C20
C28
R18
R42
R43
3 2 1
C39
C40
R48
R3
R5
C2
C3
R44
R47
L4
CR6
R20
Q6
Q7
R27
R28
CR7
TP1
CR9
C18
C41
Q3
J1
C27
C25
R45
4
C46
R50
R26
R21
R22
R46
5
CR8
C23
R23
C24
C22
C43
C45
R51
C44
C42
R29
R30
C26
J2
J3
6
7
J4
8
9
10
J5



NOTES: UNLESS OTHERWISE SPECIFIED-
1. RESISTOR VALUES ARE IN OHMS, 1/4W, 5%.
2. CAPACITOR VALUES ARE IN MICROFARADS (MF).
3. DIODES ARE IN4151.

A11 (SYNTHESIZER), VCO BOARD SCHEMATIC 7-05327401

A11 (SYNTHESIZER), VCO PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	VCO Assembly	05327401A
	VCO Schematic	7-05327401A
C1	Not Used	
C2	Capacitor, 1000 pF, Disc	C0424
C3	Capacitor, 4.7 µF, 10 V, Tant	C1011
C4	Capacitor, 100 pF, Mica	C0536
C5	Capacitor, 27 pF, 500 V, DM	C0530
C6	Capacitor, .01 µF, 100 V, Disc	C0556
C7	Capacitor, .01 µF, 100 V, Disc	C0556
C8	Capacitor, 47 pF, 500 V, DM	C0533
C9	Capacitor, 150 pF, 500 V, DM	C0537
C10	Capacitor, 9-35 pF, VARCER	C0792
C11	Capacitor, 560 pF, 300 V, DM	C1079
C12	Capacitor, .01 µF, 100 V, Disc	C0556
C13	Capacitor, .1 µF, 50 V, Disc	C0881
C14	Capacitor, 56 pF, 500 V, DM	C0534
C15	Capacitor, 150 pF, 500 V, DM	C0537
C16	Capacitor, .01 µF, 100 V, Disc	C0556
C17	Capacitor, .01 µF, 100 V, Disc	C0556
C18	Capacitor, .01 µF, 100 V, Disc	C0556
C19	Capacitor, .01 µF, 100 V, Disc	C0556
C20	Capacitor, 150 pF, 500 V, DM	C0537
C21	Capacitor, 15-60 pF, YAR CER	C1132
C22	Capacitor, .01 µF, 100 V, Disc	C0556
C23	Capacitor, 1000 pF, 100 V, DM	C0543
C24	Capacitor, .01 µF, 100 V, Disc	C0556
C25	Capacitor, .01 µF, 100 V, Disc	C0556
C26	Capacitor, .01 µF, 100 V, Disc	C0556
C27	Capacitor, .01 µF, 100 V, Disc	C0556
C28	Capacitor, .01 µF, 100 V, Disc	C0556
C29	Capacitor, .01 µF, 100 V, Disc	C0556
C30	Capacitor, .05 µF, 10 V, Disc	C0672
C31	Capacitor, .05 µF, 10 V, Disc	C0672
C32	Capacitor, .05 µF, 10 V, Disc	C0672
C33	Capacitor, .05 µF, 10 V, Disc	C0672
C34	Capacitor, 1 µF, 25 V, Disc	C0879
C35	Capacitor, 180 pF, 500 V, DM	C0707
C36	Capacitor, 1 µF, 25 V, Disc	C0879
C37	Capacitor, 1 µF, 25 V, Disc	C0879
C38	Capacitor, .05 µF, 10 V, Disc	C0672

A11 (SYNTHESIZER), VCO PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
C39	Capacitor, 1000 pF, Disc	C0424
C40	Capacitor, 1000 pF, Disc	C0424
C41	Capacitor, .05 µF, 600 V, Disc	C0422
C42	Capacitor, .01 µF, 100 V, Disc	C0556
C43	Capacitor, .01 µF, 100 V, Disc	C0556
C44	Capacitor, .01 µF, 100 V, Disc	C0556
C45	Capacitor, .01 µF, 100 V, Disc	C0556
C46	Capacitor, .01 µF, 100 V, Disc	C0556
CR1	Diode, 1N463, Selected	027913
CR2	Diode, 1N463, Selected	027913
CR3	Diode, MV2114	CR0359
CR4	Diode, 1N4151	CR0150
CR5	Diode, 1N4151	CR0150
CR6	Diode, 1N4151	CR0150
CR7	Diode, 1N4151	CR0150
CR8	Diode, 1N4151	CR0150
CR9	Diode, 1N4151	CR0150
CR10	Diode, 1N4151	CR0150
CR11	Diode, 1N4151	CR0150
CR12	Not Used	CR0373
L1	Inductor, 100 µH	L0156
L2	Inductor, 2.7 µH	L0165
L3	Inductor, 100 µH	L0156
L4	Inductor, 1.5 µH	L0164
Q1	Transistor, 40673	Q0297
Q2	Transistor, 2N3904	Q0247
Q3	Transistor, 2N3904	Q0247
Q4	Transistor, 2N5179	Q0269
Q5	Transistor, 2N5179	Q0269
Q6	Transistor, 2N4275	26013140
Q7	Transistor, 2N4258	26004011
R1	Resistor, 12 M, 1/4 W, 5%, CC	R2548
R2	Not Used	
R3	Resistor, 1 M, 1/4 W, 5%, CC	R0962
R4	Not Used	
R5	Resistor, 820 k, 1/4 W, 5%, CC	R2153
R6	Resistor, 12 k, 1/4 W, 5%, CC	R0759
R7	Resistor, 1.5 k, 1/4 W, 5%, CC	R0783

A11 (SYNTHESIZER), VCO PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R8	Resistor, 3.9 k, 1/4 W, 5%, CC	R0939
R9	Resistor, 10 k, 1/4 W, 5%, CC	R0766
R10	Resistor, 47 k, 1/4 W, 5%, CC	R0777
R11	Resistor, 47 k, 1/4 W, 5%, CC	R0777
R12	Resistor, 100 k, 1/4 W, 5%, CC	R0741
R13	Resistor, 47 Ω, 1/4 W, 5%, CC	R0743
R14	Resistor, 1.5 k, 1/4 W, 5%, CC	R0783
R15	Resistor, 1.5 k, 1/4 W, 5%, CC	R0783
R16	Resistor, Potentiometer 10 k	01111320
R17	Resistor, 22 k, 1/4 W, 5%, CC	R0768
R18	Resistor, 680 Ω, 1/4 W, 5%, CC	R1234
R19	Resistor, 10 Ω, 1/4 W, 5%, CC	R0739
R20	Resistor, 22 k, 1/4 W, 5%, CC	R0768
R21	Resistor, 68 Ω, 1/4 W, 5%, CC	R1426
R22	Resistor, 10 k, 1/4 W, 5%, CC	R0766
R23	Resistor, 680 Ω, 1/4 W, 5%, CC	R1234
R24	Resistor, 10 k, 1/4 W, 5%, CC	R0766
R25	Resistor, Potentiometer 10 k	01111320
R26	Resistor, 2.7 k, 1/4 W, 5%, CC	R0937
R27	Resistor, 2.7 k, 1/4 W, 5%, CC	R0937
R28	Resistor, 5.6 k, 1/4 W, 5%, CC	R0821
R29	Resistor, 2.7 k, 1/4 W, 5%, CC	R0937
R30	Resistor, 10 k, 1/4 W, 5%, CC	R0766
R31	Resistor, 56 Ω, 1/4 W, 5%, CC	R1554
R32	Resistor, 33 k, 1/4 W, 5%, CC	R0780
R33	Resistor, 150 Ω, 1/4 W, 5%, CC	R0983
R34	Resistor, 150 Ω, 1/4 W, 5%, CC	R0983
R35	Resistor, 1 k, 1/4 W, 5%, CC	R0765
R36	Resistor, 1 k, 1/4 W, 5%, CC	R0765
R37	Resistor, 470 Ω, 1/4 W, 5%, CC	R1044
R38	Resistor, 56 Ω, 1/4 W, 5%, CC	R1554
R39	Resistor, 56 Ω, 1/4 W, 5%, CC	R1554
R40	Resistor, 560 Ω, 1/4 W, 5%, CC	R0819
R41	Resistor, 470 Ω, 1/4 W, 5%, CC	R1044
R42	Resistor, 2.7 k, 1/4 W, 5%, CC	R0937
R43	Resistor, 2.7 k, 1/4 W, 5%, CC	R0937
R44	Resistor, 330 Ω, 1/4 W, 5%, CC	R0662
R45	Resistor, 10 Ω, 1/4 W, 5%, CC	R0739

A11 (SYNTHESIZER), VCO PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R46	Resistor, 10 Ω, 1/4 W, 5%, CC	R0739
R47	Resistor, 330 Ω, 1/4 W, 5%, CC	R0662
R48	Resistor, 220 k, 1/4 W, 5%, CC	R0967
R49	Not Used	R0821
R50	Resistor, 470 Ω, 1/4 W, 5%, CC	R1044
R51	Resistor, 68 Ω, 1/4 W, 5%, CC	R1426
U1	Integrated Circuit, LM301A	025745
U2	Integrated Circuit, MC1590	025788

CIRCUIT DESCRIPTION
RF BOARD
SCHEMATIC #7-05337501C
A12 (SYNTHESIZER)

This board contains the majority of the circuitry needed to generate the RF output. Included are: 1) three voltage-tuned oscillators; 2) a divide-by-ten prescaler; and 3) two mixers and a frequency multiplier system.

1) THREE VOLTAGE TUNED OSCILLATORS

Three voltage-tuned oscillators are required to cover the 100-200 MHz frequency range. Selection of the proper oscillator is determined by the Control Logic Board. Each oscillator consists of an inductor, voltage-variable capacitor-diodes, and a dual-insulated-gate field-effect transistor. An untuned buffer-amplifier follows each oscillator to produce approximately 2 volts of signal. A filter, C14, L5, and C15, reduces the second harmonic from the lowest frequency (100 MHz to 120 MHz) oscillator. Diodes CR5, CR10, and CR14 are used to switch the oscillator outputs. Transistors Q3, Q6, and Q9 turn on the diodes and the buffer-amplifiers.

2) DIVIDE-BY-TEN PRESCALER

The switched output from the oscillators feeds two circuits. One of these circuits is a divide-by-ten prescaler for the divide-by-N frequency control system. Transistor Q11 is operated as an ac-coupled emitter-follower to prevent loading of the signal from the oscillators. Resistors R39 and R40 provide proper bias for the divider input. The divider is a divide-by-two, then-by-five type. Integrated Circuit U2 performs the divide-by-two function. U1, U3, and U4 are connected to divide-by-five. Transistor Q10 provides level-translation from the -5.2 V logic to standard +5 V TTL levels.

3) MIXER AND ATTENUATOR SYSTEM

The output from the mixer feeds the vernier attenuator. The attenuator is a pin diode which acts as a current variable resistor. It operates as an attenuator and is controlled by the front-panel calibrated RF LEVEL control.

The remaining circuitry, shown on Sheet 2 of the schematic, produces the final output signal. The 100 MHz input signal is amplified by tuned amplifier Q13. The signal from this amplifier provides an input for the 100 and 200 MHz mixer amplifiers and for the comb generator. The comb generator, composed of tuned amplifier Q16 and diode CR24, produces a spectrum of outputs spaced 100 MHz apart and extending from 100 MHz to 800 MHz. These signals provide the inputs for

the remaining six mixer amplifiers.

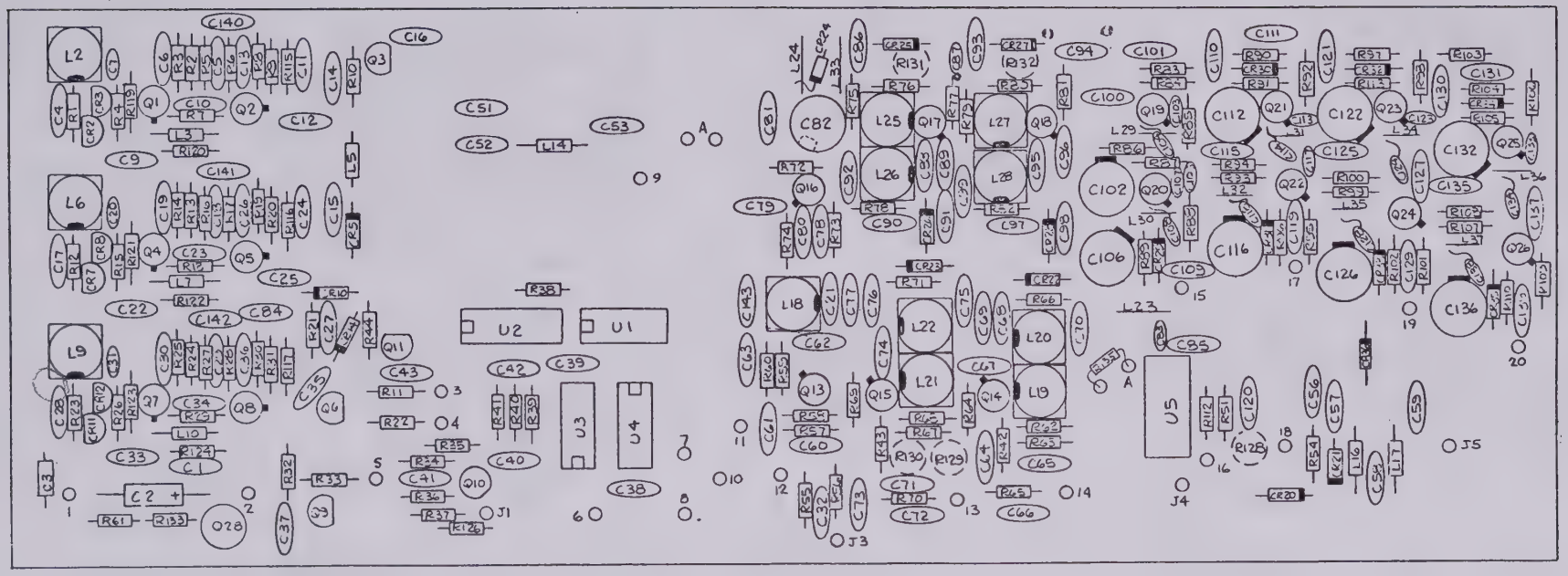
There are two types of mixer amplifiers. One is a single amplifier followed by a double-tuned circuit. This is used for the 100 MHz to 400 MHz amplifiers. The other type consists of two tuned amplifiers to achieve greater amplification for the 500 MHz to 800 MHz signals.

Diode switches are used to connect the individual amplifier outputs to the mixer input. Each diode switch is turned on at the same time power is applied to the selected amplifier. Additionally, diode switches are used in the inputs to the 300 MHz to 700 MHz amplifiers. These switches are likewise turned on with the amplifier.

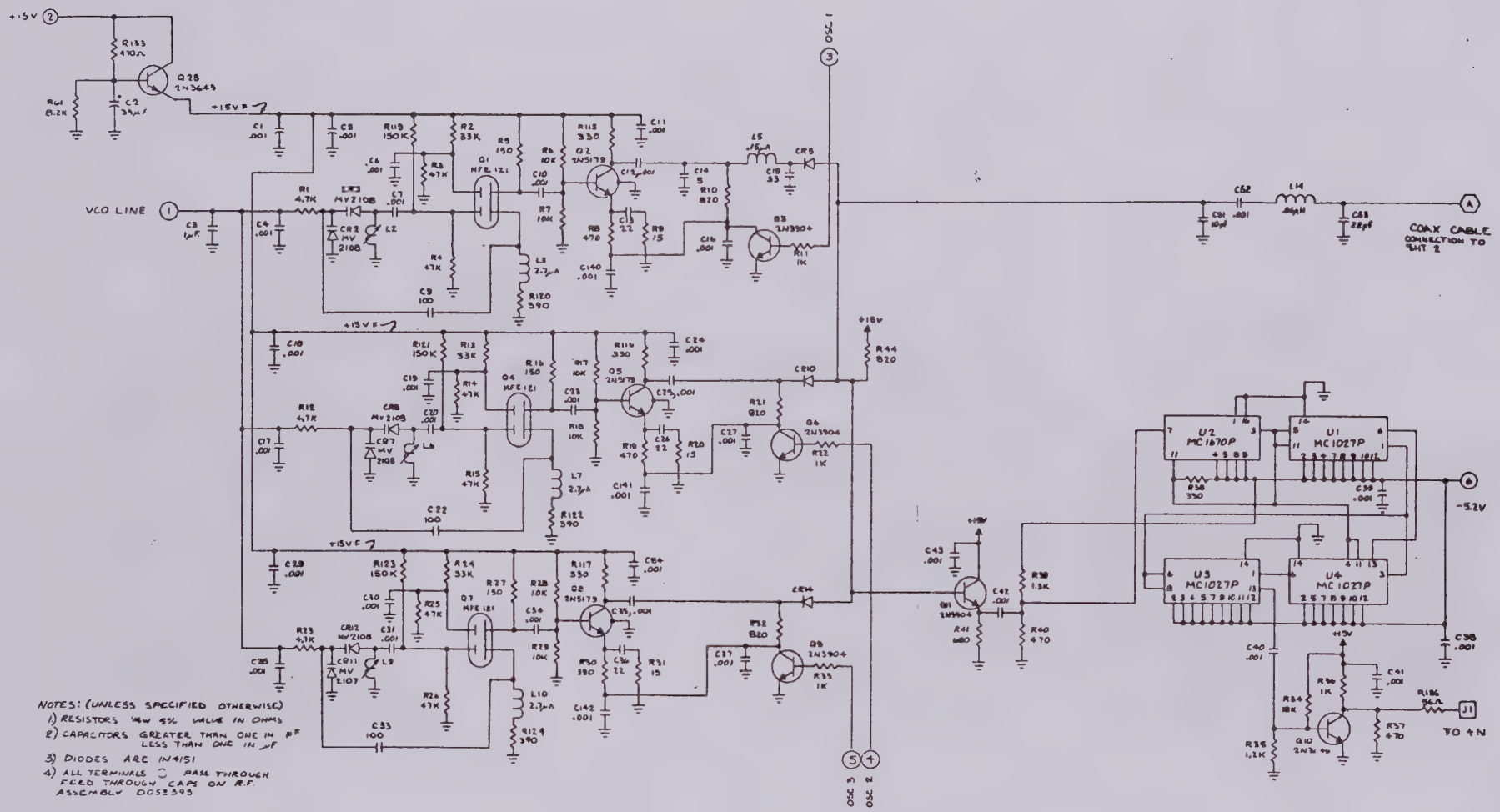
The balanced mixer U5 combines the 90 MHz to 200 MHz signal from the diode attenuator and one of the 100 MHz harmonics to produce a full-frequency-coverage spectrum. No mixing is required to cover the range from 100 MHz to 200 MHz. A voltage applied to the SELECT DIRECT input causes a bias current to flow in the mixer. The 90 MHz to 200 MHz input signal now passes directly through the mixer.

The IF output from this board is switched by diodes CR20 and CR21 to prevent loading the RF output. Filter C57, L16, C58, L17, and C59 is used to reduce any signals above the 90 MHz high-end of the IF range.

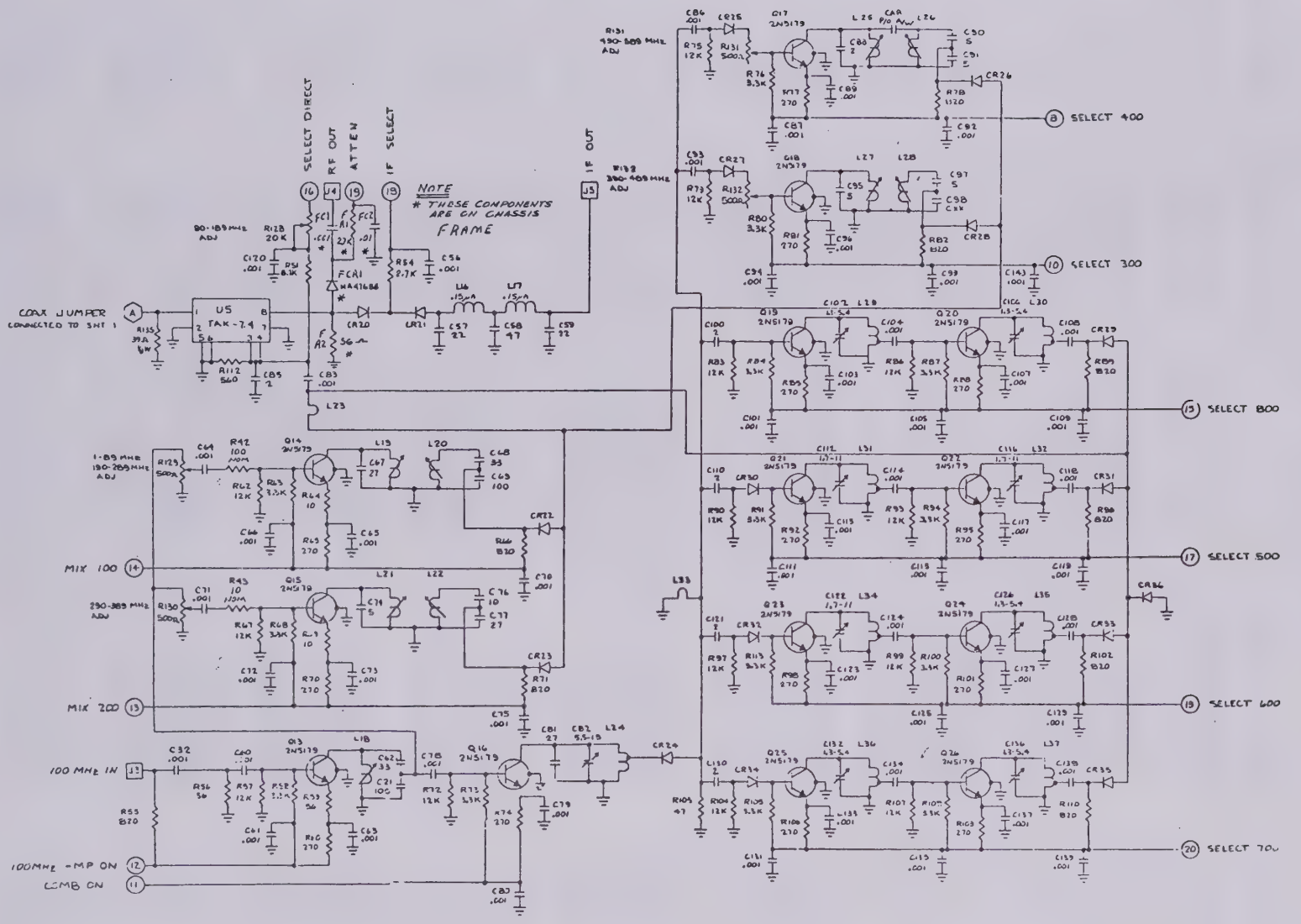
Screwdriver-adjusted potentiometers are mounted so that each may be adjusted from the outside of the instrument by simply removing the right side panel. These adjustments allow the setting of signal levels in the 1 MHz to 590 MHz range.



A12 (SYNTHESIZER), RF P.C. ASSEMBLY 05337501



A12 (SYNTHESIZER) RF SCHEMATIC 7-05337501 (SHEET 1 of 2)



A12 (SYNTHESIZER) RF SCHEMATIC 7-05337501 (SHEET 2 of 2)

A12 (SYNTHESIZER) RF PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	RF Assembly	05337501C
	RF Schematic	7-05337501C
C1	Capacitor, .001 µF, Disc	C0424
C2	Capacitor, 39 µF, 20 V	03279750
C3	Capacitor, 1 µF, 25 V	C0879
C4	Capacitor, .001 µF, Disc	C0424
C5	Capacitor, .001 µF, Disc	C0424
C6	Capacitor, .001 µF, Disc	C0424
C7	Capacitor, .001 µF, 75 V	C1155
C8	Not Used	
C9	Capacitor, 100 pF, DM	C0536
C10	Capacitor, .001 µF, Disc	C0424
C11	Capacitor, .001 µF, Disc	C0424
C12	Capacitor, .001 µF, Disc	C0424
C13	Capacitor, 22 pF, DM	C0529
C14	Capacitor, 5 pF, DM	C1071
C15	Capacitor, 33 pF, DM	C0531
C16	Capacitor, .001 µF, Disc	C0424
C17	Capacitor, .001 µF, Disc	C0424
C18	Capacitor, .001 µF, Disc	C0424
C19	Capacitor, .001 µF, Disc	C0424
C20	Capacitor, .001 µF, 75 V	C1155
C21	Capacitor, 100 pF, DM	C0874
C22	Capacitor, 100 pF, DM	C0536
C23	Capacitor, .001 µF, Disc	C0424
C24	Capacitor, .001 µF, Disc	C0424
C25	Capacitor, .001 µF, Disc	C0424
C26	Capacitor, 22 pF, DM	C0529
C27	Capacitor, .001 µF, Disc	C0424
C28	Capacitor, .001 µF, Disc	C0424
C29	Capacitor, .001 µF, Disc	C0424
C30	Capacitor, .001 µF, Disc	C0424
C31	Capacitor, .001 µF, 75 V	C1155
C32	Capacitor, .001 µF, Disc	C0424
C33	Capacitor, 100 pF, DM	C0536
C34	Capacitor, .001 µF, Disc	C0424
C35	Capacitor, .001 µF, Disc	C0424
C36	Capacitor, 22 pF, DM	C0529
C37	Capacitor, .001 µF, Disc	C0424
C38	Capacitor, .001 µF, Disc	C0424

A12 (SYNTHESIZER) RF PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
C39	Capacitor, .001 µF, Disc	C0424
C40	Capacitor, .001 µF, Disc	C0424
C41	Capacitor, .001 µF, Disc	C0424
C42	Capacitor, .001 µF, Disc	C0424
C43	Capacitor, .001 µF, Disc	C0424
C44	Not Used	
C45	Not Used	
C46	Not Used	
C47	Not Used	
C48	Not Used	
C49	Not Used	
C50	Not Used	
C51	Capacitor, 10 pF, Mica	C0527
C52	Capacitor, .001 µF, Disc	C0424
C53	Capacitor, 22 pF, Mica	C0530
C54	Not Used	
C55	Not Used	
C56	Capacitor, .001 µF, Disc	C0424
C57	Capacitor, 22 pF, DM	C0529
C58	Capacitor, 47 pF, DM	C0533
C59	Capacitor, 22 pF, DM	C0529
C60	Capacitor, .001 µF, Disc	C0424
C61	Capacitor, .001 µF, Disc	C0424
C62	Capacitor, 33 pF, DM	C0531
C63	Capacitor, .001 µF, Disc	C0424
C64	Capacitor, .001 µF, Disc	C0424
C65	Capacitor, .001 µF, Disc	C0424
C66	Capacitor, .001 µF, Disc	C0424
C67	Capacitor, 27 pF, Mica	C0530
C68	Capacitor, 33 pF, DM	C0531
C69	Capacitor, 100 pF, DM	C0536
C70	Capacitor, .001 µF, Disc	C0424
C71	Capacitor, .001 µF, Disc	C0424
C72	Capacitor, .001 µF, Disc	C0424
C73	Capacitor, .001 µF, Disc	C0424
C74	Capacitor, 5 pF, DM	C1071
C75	Capacitor, .001 µF, Disc	C0424
C76	Capacitor, 10 pF, DM	C1160
C77	Capacitor, 27 pF, Mica	C0529
C78	Capacitor, .001 µF, Disc	C0424

A12 (SYNTHESIZER) RF PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
C79	Capacitor, .001 µF, Disc	C0424
C80	Capacitor, .001 µF, Disc	C0424
C81	Capacitor, 27 pF, Mica	C0529
C82	Capacitor, 5.5 - 18 pF, Trimmer	C0712
C83	Capacitor, .001 µF, 75 V	C1155
C84	Capacitor, .001 µF, Disc	C0424
C85	Capacitor, 2 pF, Disc	C0261
C86	Capacitor, .001 µF, Disc	C0424
C87	Capacitor, .001 µF, 75 V	C1155
C88	Capacitor, 2 pF, Mica	03175030
C89	Capacitor, .001 µF, Disc	C0424
C90	Capacitor, 5 pF, DM	C1071
C91	Capacitor, 5 pF, DM	C1071
C92	Capacitor, .001 µF, Disc	C0424
C93	Capacitor, .001 µF, Disc	C0424
C94	Capacitor, .001 µF, Disc	C0424
C95	Capacitor, 5 pF, DM	C1071
C96	Capacitor, .001 µF, Disc	C0424
C97	Capacitor, 5 pF, DM	C1071
C98	Factory Selected (27 pF Nominal)	CXXXX
C99	Capacitor, .001 µF, Disc	C0424
C100	Capacitor, 2 pF, Disc	C0261
C101	Capacitor, .001 µF, Disc	C0424
C102	Capacitor, 1.3 - 5.4 pF, Trimmer	C1254
C103	Capacitor, .001 µF, 75 V	C1155
C104	Capacitor, .001 µF, 75 V	C1155
C105	Capacitor, .001 µF, 75 V	C1155
C106	Capacitor, 1.3 - 5.4 pF, Trimmer	C1254
C107	Capacitor, .001 µF, 75 V	C1155
C108	Capacitor, .001 µF, 75 V	C1155
C109	Capacitor, .001 µF, Disc	C0424
C110	Capacitor, 2 pF, Disc	C0261
C111	Capacitor, .001 µF, Disc	C0424
C112	Capacitor, 1.7 - 11 pF, Trimmer	C1255
C113	Capacitor, .001 µF, 75 V	C1155
C114	Capacitor, .001 µF, 75 V	C1155
C115	Capacitor, .001 µF, Disc	C0424
C116	Capacitor, 1.7 - 11 pF, Trimmer	C1255
C117	Capacitor, .001 µF, 75 V	C1155

A12 (SYNTHESIZER) RF PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
C118	Capacitor, .001 µF, 75 V	C1155
C119	Capacitor, .001 µF, Disc	C0424
C120	Capacitor, .001 µF, Disc	C0424
C121	Capacitor, 2 pF, Disc	C0261
C122	Capacitor, 1.7 - 11 pF, Trimmer	C1255
C123	Capacitor, .001 µF, 75 V	C1155
C124	Capacitor, .001 µF, 75 V	C1155
C125	Capacitor, .001 µF, Disc	C0424
C126	Capacitor, 1.3 - 5.4 pF, Trimmer	C1254
C127	Capacitor, .001 µF, Disc	C0424
C128	Capacitor, .001 µF, 75 V	C1155
C129	Capacitor, .001 µF, Disc	C0424
C130	Capacitor, 2 pF, Disc	C0261
C131	Capacitor, .001 µF, Disc	C0424
C132	Capacitor, 1.3 - 5.4 pF, Trimmer	C1254
C133	Capacitor, .001 µF, 75 V	C1155
C134	Capacitor, .001 µF, 75 V	C1155
C135	Capacitor, .001 µF, Disc	C0424
C136	Capacitor, 1.3 - 5.4 pF, Trimmer	C1254
C137	Capacitor, .001 µF, Disc	C0424
C138	Capacitor, .001 µF, 75 V	C1155
C139	Capacitor, .001 µF, Disc	C0424
C140	Capacitor, .001 µF, Disc	C0424
C141	Capacitor, .001 µF, Disc	C0424
C142	Capacitor, .001 µF, Disc	C0424
C143	Capacitor, .001 µF, Disc	C0424
CR1	Not Used	
CR2	Diode, MV2108	CR0354
CR3	Diode, MV2108	CR0354
CR4	Not Used	
CR5	Diode, 1N4151	CR0150
CR6	Not Used	
CR7	Diode, MV2108	CR0354
CR8	Diode, MV2108	CR0354
CR9	Not Used	
CR10	Diode, 1N4151	CR0150
CR11	Diode, MV2107	CR0375
CR12	Diode, MV2108	CR0354
CR13	Not Used	

A12 (SYNTHESIZER) RF PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
CR14	Diode, 1N4151	CR0150
CR15	Diode, 1N4151	CR0150
CR16	Diode, 1N4151	CR0150
CR17	Diode, 1N4151	CR0150
CR18	Diode, 1N4151	CR0150
CR19	Not Used	
CR20	Diode, 1N4151	CR0150
CR21	Diode, 1N4151	CR0150
CR22	Diode, 1N4151	CR0150
CR23	Diode, 1N4151	CR0150
CR24	Diode, 1N4151	CR0150
CR25	Diode, 1N4151	CR0150
CR26	Diode, 1N4151	CR0150
CR27	Diode, 1N4151	CR0150
CR28	Diode, 1N4151	CR0150
CR29	Diode, 1N4151	CR0150
CR30	Diode, 1N4151	CR0150
CR31	Diode, 1N4151	CR0150
CR32	Diode, 1N4151	CR0150
CR33	Diode, 1N4151	CR0150
CR34	Diode, 1N4151	CR0150
CR35	Diode, 1N4151	CR0150
CR36	Diode, 1N4151	CR0150
CR37	Not Used	
L1	Not Used	
L2	Inductor, Adj	03966703
L3	Inductor, 2.7 µH	L0048
L4	Not Used	
L5	Inductor, .15 µH	L0080
L6	Inductor, Adj	03966706
L7	Inductor, 2.7 µH	L0048
L8	Not Used	
L9	Inductor, Adj	03966702
L10	Inductor, 2.7 µH	L0048
L11	Not Used	
L12	Not Used	
L13	Not Used	
L14	Inductor, .06 µH	L0158
L15	Not Used	

A12 (SYNTHESIZER) RF PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
L16	Inductor, .15 µH	L0080
L17	Inductor, .15 µH	L0080
L18	Inductor, Adj	03966703
L19	Inductor, Adj	03966703
L20	Inductor, Adj	03966703
L21	Inductor, Adj	03966704
L22	Inductor, Adj	03966704
L23	Inductor, Loop, 1/8" H x .2" W, #18	
L24	Inductor, Adj	03967803
L25	Inductor, Adj	03966701
L26	Inductor, Adj	03966701
L27	Inductor, Adj	03966702
L28	Inductor, Adj	03966702
L29	Inductor, Loop, 1/8" H x 1/4" W, #18	
L30	Inductor, Loop, 1/8" H x 1/4" W, #18	
L31	Inductor, Loop, 3/16" H x 1/4" W, #18	
L32	Inductor, Loop, 3/16" H x 1/4" W, #18	
L33	Inductor, Loop, .4" H x .4" W, #18	
L34	Inductor, Loop, 1/4" H x 1/4" W, #18	
L35	Inductor, Loop, 3/16" H x 1/4" W, #18	
L36	Inductor, Loop, 3/16" H x 1/4" W, #18	
L37	Inductor, Loop, 1/8" H x 1/4" W, #18	
L38	Not Used	
Q1	Transistor, MFE-121	Q0311
Q2	Transistor, 2N5179	Q0269
Q3	Transistor, 2N3904	Q0247
Q4	Transistor, MFE-121	Q0311
Q5	Transistor, 2N5179	Q0269
Q6	Transistor, 2N3904	Q0247
Q7	Transistor, MFE-121	Q0311
Q8	Transistor, 2N5179	Q0269
Q9	Transistor, 2N3904	Q0247
Q10	Transistor, 2N3646	Q0218
Q11	Transistor, 2N3904	Q0247
Q12	Not Used	
Q13	Transistor, 2N5179	Q0269
Q14	Transistor, 2N5179	Q0269
Q15	Transistor, 2N5179	Q0269
Q16	Transistor, 2N5179	Q0269
Q17	Transistor, 2N5179	Q0269

A12 (SYNTHESIZER) RF PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
Q18	Transistor, 2N5179	Q0269
Q19	Transistor, 2N5179	Q0269
Q20	Transistor, 2N5179	Q0269
Q21	Transistor, 2N5179	Q0269
Q22	Transistor, 2N5179	Q0269
Q23	Transistor, 2N5179	Q0269
Q24	Transistor, 2N5179	Q0269
Q25	Transistor, 2N5179	Q0269
Q26	Transistor, 2N5179	Q0269
Q27	Not Used	
Q28	Transistor, 2N3643	Q0179
R1	Resistor, 4.7 k, 1/4 W, 5%	R0892
R2	Resistor, 33 k, 1/4 W, 5%	R0780
R3	Resistor, 47 k, 1/4 W, 5%	R0777
R4	Resistor, 47 k, 1/4 W, 5%	R0777
R5	Resistor, 150 Ω, 1/4 W, 5%	R0983
R6	Resistor, 10 k, 1/4 W, 5%	R0766
R7	Resistor, 10 k, 1/4 W, 5%	R0766
R8	Resistor, 470 Ω, 1/4 W, 5%	R1044
R9	Resistor, 15 Ω, 1/4 W, 5%	R1607
R10	Resistor, 820 Ω, 1/4 W, 5%	R0762
R11	Resistor, 1 k, 1/4 W, 5%	R0765
R12	Resistor, 4.7 k, 1/4 W, 5%	R0892
R13	Resistor, 33 k, 1/4 W, 5%	R0780
R14	Resistor, 47 k, 1/4 W, 5%	R0777
R15	Resistor, 47 k, 1/4 W, 5%	R0777
R16	Resistor, 150 Ω, 1/4 W, 5%	R0983
R17	Resistor, 10 k, 1/4 W, 5%	R0766
R18	Resistor, 10 k, 1/4 W, 5%	R0766
R19	Resistor, 470 Ω, 1/4 W, 5%	R1044
R20	Resistor, 15 Ω, 1/4 W, 5%	R1607
R21	Resistor, 820 Ω, 1/4 W, 5%	R0762
R22	Resistor, 1 k, 1/4 W, 5%	R0765
R23	Resistor, 4.7 k, 1/4 W, 5%	R0892
R24	Resistor, 33 k, 1/4 W, 5%	R0780
R25	Resistor, 47 k, 1/4 W, 5%	R0777
R26	Resistor, 47 k, 1/4 W, 5%	R0777
R27	Resistor, 150 Ω, 1/4 W, 5%	R0983
R28	Resistor, 10 k, 1/4 W, 5%	R0766

A12 (SYNTHESIZER) RF PARTS LIST (Cont'd)

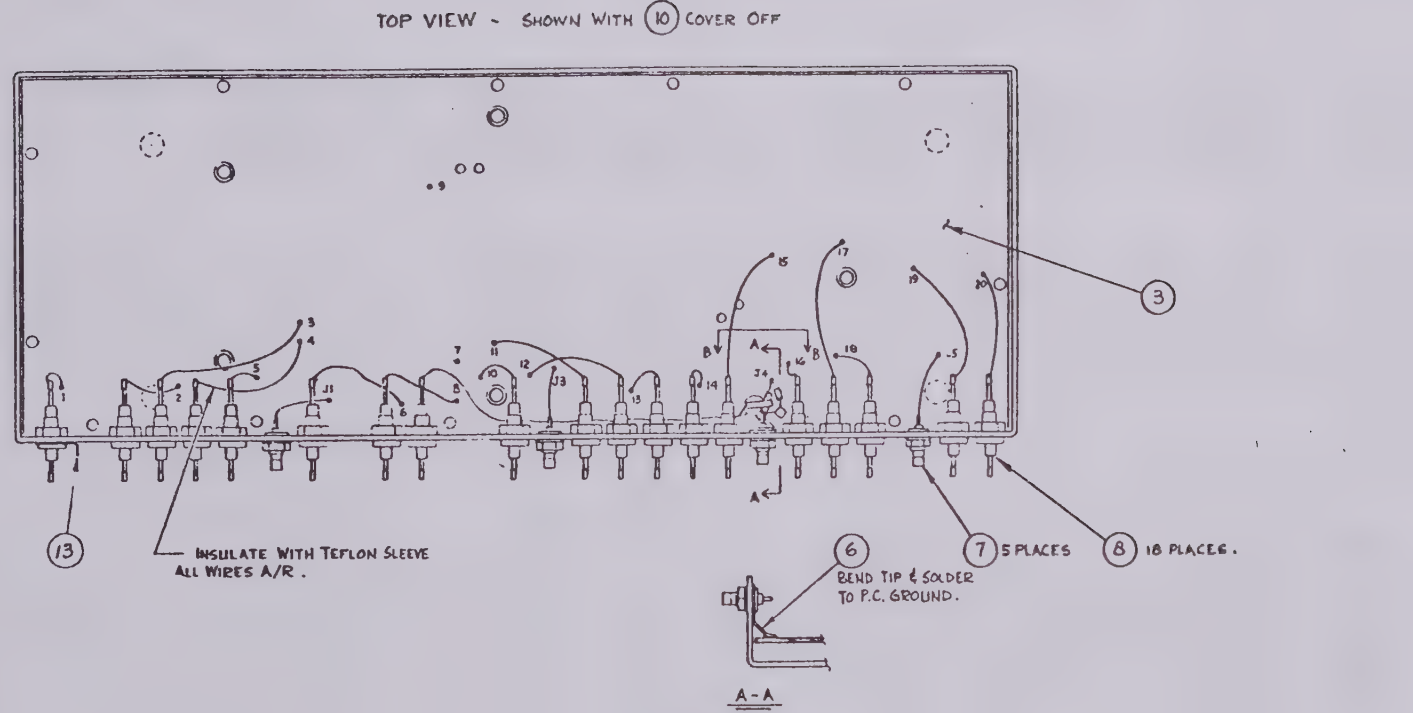
REF.	DESCRIPTION	SD PART NO.
R29	Resistor, 10 k, 1/4 W, 5%	R0766
R30	Resistor, 390 Ω, 1/4 W, 5%	R0880
R31	Resistor, 15 Ω, 1/4 W, 5%	R1607
R32	Resistor, 820 Ω, 1/4 W, 5%	R0762
R33	Resistor, 1 k, 1/4 W, 5%	R0765
R34	Resistor, 18 k, 1/4 W, 5%	R0785
R35	Resistor, 1.2 k, 1/4 W, 5%	R0809
R36	Resistor, 1 k, 1/4 W, 5%	R0765
R37	Resistor, 470 Ω, 1/4 W, 5%	R1044
R38	Resistor, 330 Ω, 1/4 W, 5%	R0662
R39	Resistor, 1.3 k, 1/4 W, 5%	R0737
R40	Resistor, 470 Ω, 1/4 W, 5%	R1044
R41	Resistor, 680 Ω, 1/4 W, 5%	R1234
R42	Resistor, 100 Ω, 1/4 W, 5%	R0966
R43	Resistor, 10 Ω, 1/4 W, 5%	R0739
R44	Resistor, 820 Ω, 1/4 W, 5%	R0762
R45	Not Used	
R46	Not Used	
R47	Not Used	
R48	Not Used	
R49	Not Used	
R50	Not Used	
R51	Resistor, 15 k, 1/4 W, 5%	R0728
R52	Not Used	
R53	Not Used	
R54	Resistor, 2.7 k, 1/4 W, 5%	R0937
R55	Resistor, 820 Ω, 1/4 W, 5%	R0762
R56	Resistor, 56 Ω, 1/4 W, 5%	R1554
R57	Resistor, 12 k, 1/4 W, 5%	R0759
R58	Resistor, 3.3 k, 1/4 W, 5%	R0742
R59	Resistor, 56 Ω, 1/4 W, 5%	R1554
R60	Resistor, 270 Ω, 1/4 W, 5%	R0694
R61	Resistor, 8.2 k, 1/4 W, 5%	R0883
R62	Resistor, 12 k, 1/4 W, 5%	R0759
R63	Resistor, 3.3 k, 1/4 W, 5%	R0742
R64	Resistor, 10 Ω, 1/4 W, 5%	R0739
R65	Resistor, 270 Ω, 1/4 W, 5%	R0694
R66	Resistor, 820 Ω, 1/4 W, 5%	R0762
R67	Resistor, 12 k, 1/4 W, 5%	R0759
R68	Resistor, 3.3 k, 1/4 W, 5%	R0742

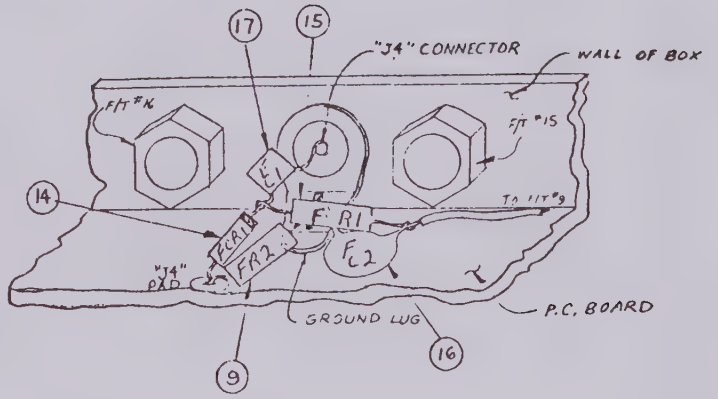
A12 (SYNTHESIZER) RF PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R69	Resistor, 10 Ω, 1/4 W, 5%	R0739
R70	Resistor, 270 Ω, 1/4 W, 5%	R0694
R71	Resistor, 820 Ω, 1/4 W, 5%	R0762
R72	Resistor, 12 k, 1/4 W, 5%	R0759
R73	Resistor, 3.3 k, 1/4 W, 5%	R0742
R74	Resistor, 270 Ω, 1/4 W, 5%	R0694
R75	Resistor, 12 k, 1/4 W, 5%	R0759
R76	Resistor, 3.3 k, 1/4 W, 5%	R0742
R77	Resistor, 270 Ω, 1/4 W, 5%	R0694
R78	Resistor, 820 Ω, 1/4 W, 5%	R0762
R79	Resistor, 12 k, 1/4 W, 5%	R0759
R80	Resistor, 3.3 k, 1/4 W, 5%	R0742
R81	Resistor, 270 Ω, 1/4 W, 5%	R0694
R82	Resistor, 820 Ω, 1/4 W, 5%	R0762
R83	Resistor, 12 k, 1/4 W, 5%	R0759
R84	Resistor, 3.3 k, 1/4 W, 5%	R0742
R85	Resistor, 270 Ω, 1/4 W, 5%	R0694
R86	Resistor, 12 k, 1/4 W, 5%	R0759
R87	Resistor, 3.3 k, 1/4 W, 5%	R0742
R88	Resistor, 270 Ω, 1/4 W, 5%	R0694
R89	Resistor, 820 Ω, 1/4 W, 5%	R0762
R90	Resistor, 12 k, 1/4 W, 5%	R0759
R91	Resistor, 3.3 k, 1/4 W, 5%	R0742
R92	Resistor, 270 Ω, 1/4 W, 5%	R0694
R93	Resistor, 12 k, 1/4 W, 5%	R0759
R94	Resistor, 3.3 k, 1/4 W, 5%	R0742
R95	Resistor, 270 Ω, 1/4 W, 5%	R0694
R96	Resistor, 820 Ω, 1/4 W, 5%	R0762
R97	Resistor, 12 k, 1/4 W, 5%	R0759
R98	Resistor, 270 Ω, 1/4 W, 5%	R0694
R99	Resistor, 12 k, 1/4 W, 5%	R0759
R100	Resistor, 3.3 k, 1/4 W, 5%	R0742
R101	Resistor, 270 Ω, 1/4 W, 5%	R0694
R102	Resistor, 820 Ω, 1/4 W, 5%	R0762
R103	Resistor, 47 Ω, 1/4 W, 5%	R0743
R104	Resistor, 12 k, 1/4 W, 5%	R0759
R105	Resistor, 3.3 k, 1/4 W, 5%	R0742
R106	Resistor, 270 Ω, 1/4 W, 5%	R0694
R107	Resistor, 12 k, 1/4 W, 5%	R0759
R108	Resistor, 3.3 k, 1/4 W, 5%	R0742

A12 (SYNTHESIZER) RF PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R109	Resistor, 270 Ω, 1/4 W, 5%	R0694
R110	Resistor, 820 Ω, 1/4 W, 5%	R0762
R111	Not Used	
R112	Resistor, 560 Ω, 1/4 W, 5%	R0819
R113	Resistor, 3.3 k, 1/4 W, 5%	R0742
R114	Not Used	
R115	Resistor, 330 Ω, 1/4 W, 5%	R0662
R116	Resistor, 330 Ω, 1/4 W, 5%	R0662
R117	Resistor, 330 Ω, 1/4 W, 5%	R0662
R118	Not Used	
R119	Resistor, 150 k, 1/4 W, 5%	R0961
R120	Resistor, 390 Ω, 1/4 W, 5%	R0880
R121	Resistor, 150 k, 1/4 W, 5%	R0961
R122	Resistor, 390 Ω, 1/4 W, 5%	R0880
R123	Resistor, 150 k, 1/4 W, 5%	R0961
R124	Resistor, 390 Ω, 1/4 W, 5%	R0880
R125	Not Used	
R126	Resistor, 56 Ω, 1/4 W, 5%	R1554
R127	Not Used	
R128	Resistor, Potentiometer, 20 k	R2419
R129	Resistor, Potentiometer, 500 Ω	R2375
R130	Resistor, Potentiometer, 500 Ω	R2375
R131	Resistor, Potentiometer, 500 Ω	R2375
R132	Resistor, Potentiometer, 500 Ω	R2375
R133	Resistor, 470 Ω, 1/4 W, 5%	R1044
R134	Not Used	
R135	Resistor, 39 Ω, 1/8 W, 5%	R1829
U1	Integrated Circuit, MC1027P	25719
U2	Integrated Circuit, MC1670P	25765
U3	Integrated Circuit, MC1027P	25719
U4	Integrated Circuit, MC1027P	25719
U5	Integrated Circuit, Mixer MCL TAK 7.4	RF0015

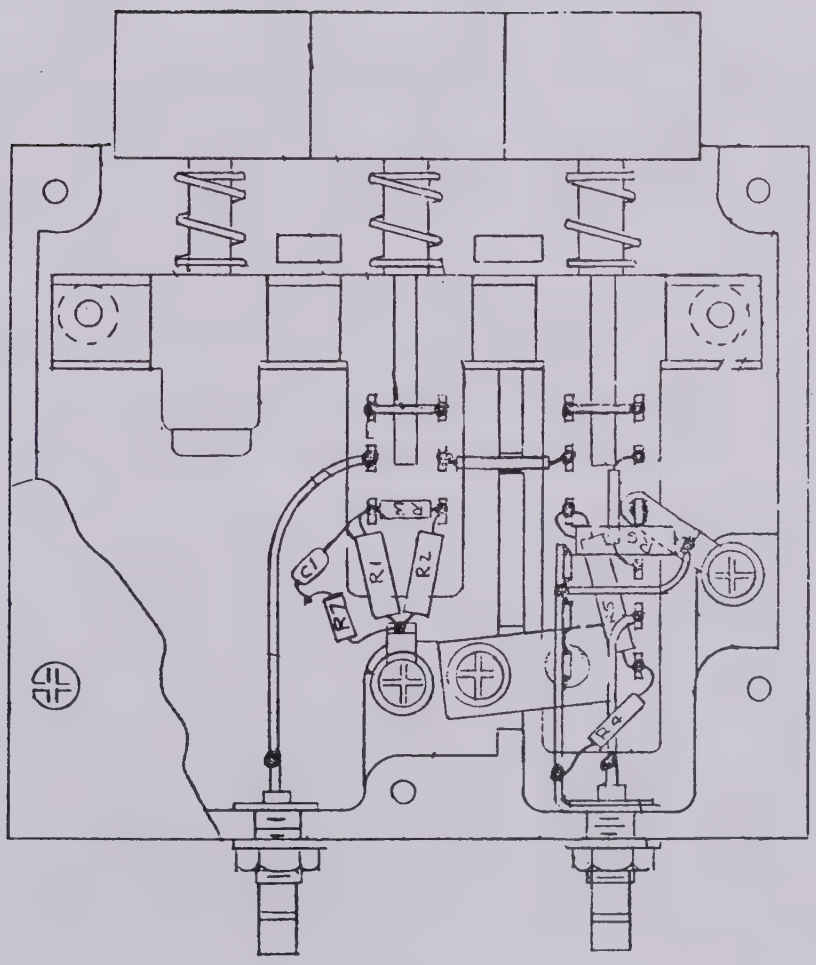




A12 (SYNTHESIZER), RF ASSEMBLY 053393

A12 RF ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
A12	RF Final Assembly	053393C
2	Cover, RF Box	45324
3	Feed-Thru Capacitor, 2300 pF, (QTY 20)	C1253
4	RF Box	45323
J1	Coax Connector, Min.	J0618
J2	Not Used	
J3	Coax Connector, Min.	J0618
J4	Coax Connector, Min.	J0618
J5	Coax Connector, Min.	J0618
FC1	Capacitor, .001 µF, 50 V	C1155
FC2	Capacitor, .01 µF, Disc	C0556
FCR1	Diode, MA47688	CR0373
FR1	Resistor, 2.7 k 5%, 1/4 W	R0937
FR2	Resistor, 56 Ω 5%, 1/4 W	R1554



A13 (SYNTHESIZER), ATTENUATOR ASSEMBLY 053482

A13 (SYNTHESIZER) ATTENUATOR ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
A13	Attenuator Assembly	053482A
1	Coax Connector, Min.	J0618
2	Pushbutton Switch	39766
C1	Capacitor, 5 pF, DM	C1071
R1	Resistor, 62 Ω, 1/4 W, 5%	R1555
R2	Resistor, 62 Ω, 1/4 W, 5%	R1555
R3	Resistor, 270 Ω, 1/8 W, 5%	R1443
R4	Resistor, 56 Ω, 1/8 W, 5%	R1833
R5	Resistor, 2.7 k, 1/4 W, 5%	R0937
R6	Resistor, 47 Ω, 1/4 W, 5%	R0743
R7	Resistor, 68 Ω, 1/4 W, 5%	R1426

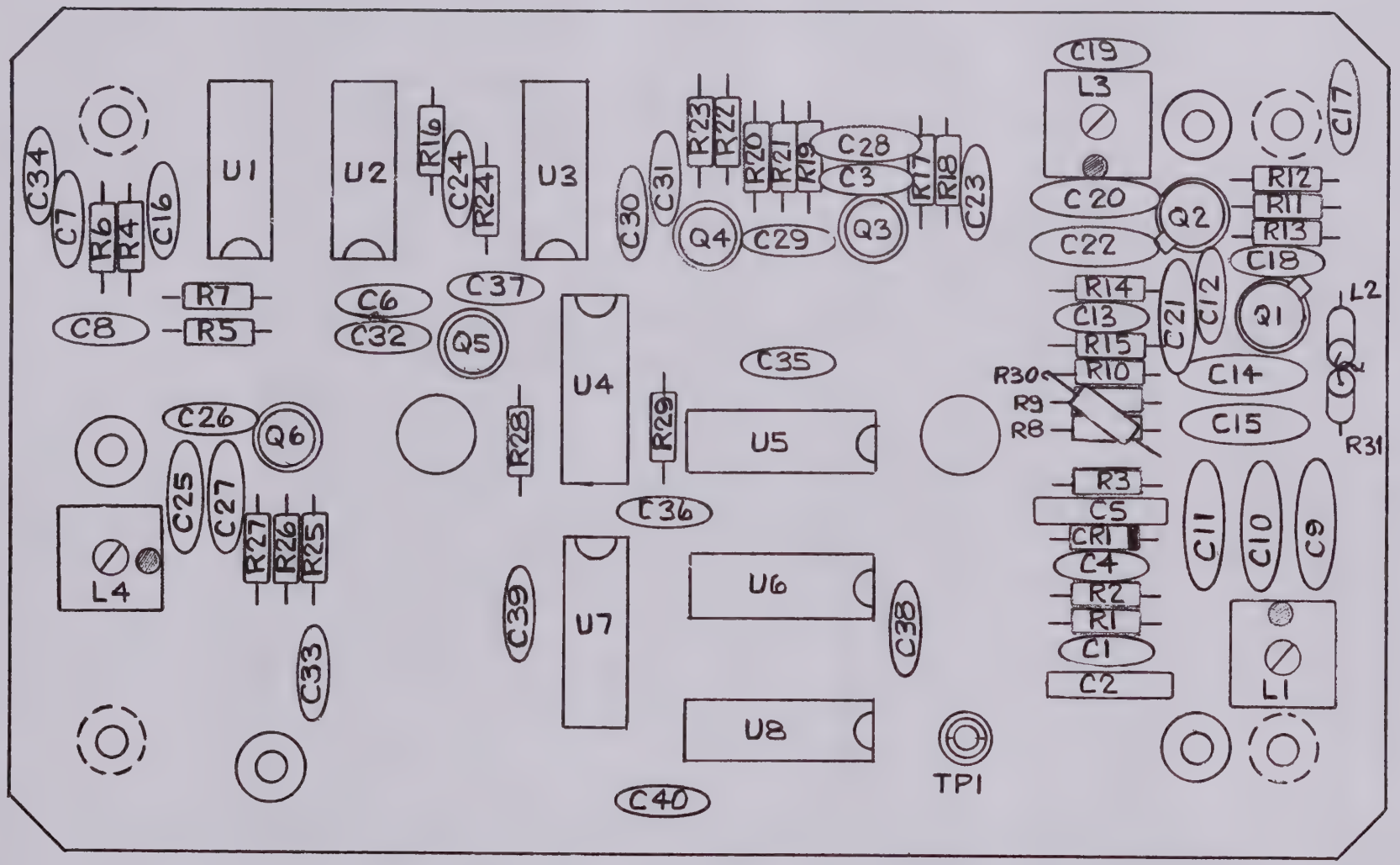
CIRCUIT DESCRIPTION
100 MHz MULTIPLIER
SCHEMATIC #39521D
A14 (SYNTHESIZER)

The 100 MHz Multiplier provides signals at both 100 MHz and 10 MHz which are phase-locked to the 1 MHz reference oscillator. A voltage-controlled oscillator (VCO) produces a frequency of 100 MHz which is divided-down to 1 MHz. This 1 MHz signal is compared to the reference 1 MHz and the resulting error voltage maintains the oscillator on exactly 100 MHz. The 10 MHz output is derived from the first divide-by-10.

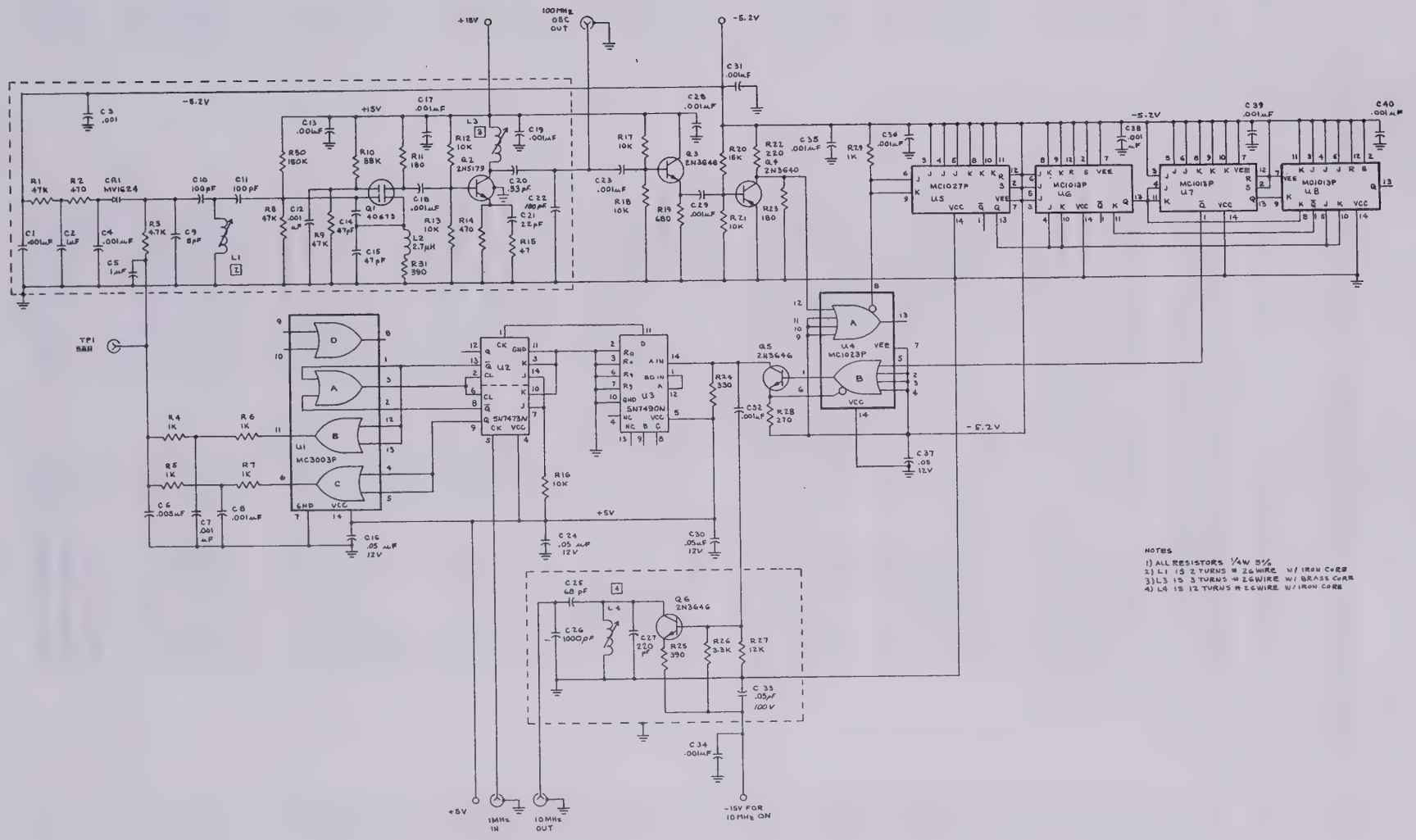
The VCO consists of Q1, a dual-insulated-gate MOS-type transistor, voltage-variable capacitor CR1, inductor L1, and capacitor C9. L1 is set to place the error-control voltage in the center of its range. Feedback and bias are provided by C14, C15, and L2. A tuned stage, Q2, amplifies and isolates the oscillator signal. An output is provided at this point. Transistors Q2 and Q3 provide a proper voltage level to operate the first divide-by-ten circuit.

Integrated circuits U4 - U8 perform a divide-by-ten function. The 100 MHz input signal is buffered by U4-A, divided-by-two by U5, and divided-by-five by U6 - U8. The resulting 10 MHz signal is buffered by U4-B and converted to +5 V logic levels by Q5. Transistor amplifier Q6 is tuned at 10 MHz and amplifies the 10 MHz signal. This amplifier operates only when -15 V is applied to the "10 MHz ON" line.

The remaining circuitry on the board consists of the second divide-by-ten circuit (U3) and the phase detector (U1 and U2). U2 is a dual J-K flip-flop with steering inputs (J & K) on each flip-flop connected so that the clock pulses on pins 1 and 5 (from the divided 1 MHz and the reference 1 MHz) cause the $\overline{Q}$ outputs to go low. When both $\overline{Q}$ outputs are low, then gate U1-A will have a low output which resets both flip-flops. Gates U1-B and U1-C are connected to opposite flip-flop outputs (Q on one and $\overline{Q}$ on the other). Their output voltages are summed by R4 through R7 and filtered by C5 through C8. If both 1 MHz signals are precisely the same frequency, the outputs of U1-B and U1-C will be of equal duration and the voltage fed to the oscillator will hold constant. If the oscillator frequency varies,then one output will be of longer duration and the control voltage will move to place the oscillator back on frequency.



A14 (SYNTHESIZER), 100 MHz MULTIPLIER P.C. ASSEMBLY 39524



A14 (SYNTHESIZER), 100 MHz MULTIPLIER P.C. SCHEMATIC 39521

A14 (SYNTHESIZER), 100 MHz MULTIPLIER PARTS LIST

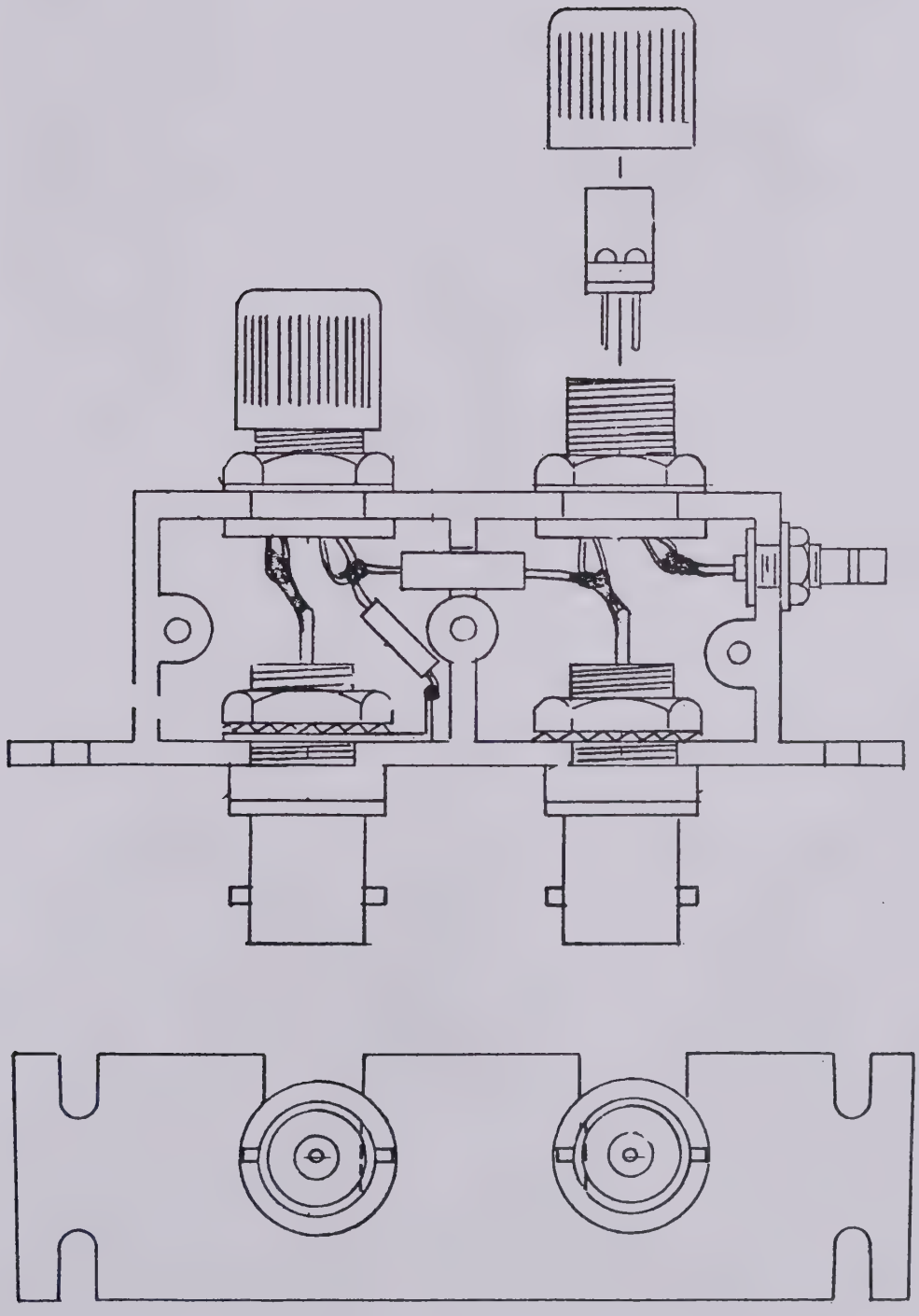
REF.	DESCRIPTION	SD PART NO.
A14	100 MHz Multiplier Assembly	39524B
A14	100 MHz Multiplier Schematic	39521D
C1	Capacitor, .001 µF, 500 V, Disc	C0424
C2	Capacitor, 1 µF, 25 V, Disc	C0879
C3	Capacitor, .001 µF, 500 V, Disc	C0424
C4	Capacitor, .001 µF, 500 V, Disc	C0424
C5	Capacitor, 1 µF, 25 V, Disc	C0879
C6	Capacitor, .005 µF, 150 V, Disc	C0325
C7	Capacitor, .001 µF, 500 V, Disc	C0424
C8	Capacitor, .001 µF, 500 V, Disc	C0424
C9	Capacitor, 5 pF, DM, DM15	C1071
C10	Capacitor, .05 µF, 12 V, Disc	C0672
C11	Capacitor, 100 pF, DM, DM15	C0536
C12	Capacitor, .001 µF, 500 V, Disc	C0424
C13	Capacitor, .001 µF, 500 V, Disc	C0424
C14	Capacitor, 47 pF, DM, DM15	C0533
C15	Capacitor, 47 pF, DM, DM15	C0533
C16	Capacitor, .001 µF, 500 V, Disc	C0424
C17	Capacitor, .001 µF, 500 V, Disc	C0424
C18	Capacitor, .001 µF, 500 V, Disc	C0424
C19	Capacitor, .001 µF, 500 V, Disc	C0424
C20	Capacitor, 33 pF, DM, DM15	C0531
C21	Capacitor, 22 pF, DM, DM15	C0529
C22	Capacitor, 100 pF, DM, DM15	C0536
C23	Capacitor, .001 µF, 500 V, Disc	C0424
C24	Capacitor, .05 µF, 12 V, Disc	C0672
C25	Capacitor, 68 pF, DM, DM15	C0635
C26	Capacitor, 1000 pF, 100 V, 5%	C1144
C27	Capacitor, 220 pF, DM, DM15	C0538
C28	Capacitor, .001 µF, 500 V, Disc	C0424
C29	Capacitor, .001 µF, 500 V, Disc	C0424
C30	Capacitor, .05 µF, 12 V, Disc	C0672
C31	Capacitor, .001 µF, 500 V, Disc	C0424
C32	Capacitor, .001 µF, 500 V, Disc	C0424
C33	Capacitor, .05 µF, 50 V, Disc	03281790
C34	Capacitor, .001 µF, 500 V, Disc	C0424
C35	Capacitor, .001 µF, 500 V, Disc	C0424
C36	Capacitor, .001 µF, 500 V, Disc	C0424
C37	Capacitor, .05 µF, 12 V, Disc	C0672
C38	Capacitor, .001 µF, 500 V, Disc	C0424

A14 (SYNTHESIZER), 100 MHz MULTIPLIER PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
C39	Capacitor, .001 µF, 500 V, Disc	C0424
C40	Capacitor, .001 µF, 500 V, Disc	C0424
CR1	Diode, MV1624	CR0353
CR2	Diode, FD700	CR0356
L1	Inductor	39667-2
	Coil Form	E0223
L2	Inductor, 2.7 µH	L0048
L3	Inductor	39667-4
	Coil Form	E0289
L4	Inductor	39667-5
	Coil Form	E0223
Q1	Transistor, 40673	Q0297
Q2	Transistor, 2N5179	Q0269
Q3	Transistor, 2N3646	Q0218
Q4	Transistor, 2N3640	Q0178
Q5	Transistor, 2N3646	Q0218
Q6	Transistor, 2N3646	Q0218
R1	Resistor, 47 k, 1/4 W, 5%	R0777
R2	Resistor, 470 Ω, 1/4 W, 5%	R0744
R3	Resistor, 4.7 k, 1/4 W, 5%	R0892
R4	Resistor, 1 k, 1/4 W, 5%	R0765
R5	Resistor, 1 k, 1/4 W, 5%	R0765
R6	Resistor, 1 k, 1/4 W, 5%	R0765
R7	Resistor, 1 k, 1/4 W, 5%	R0765
R8	Resistor, 47 k, 1/4 W, 5%	R0777
R9	Resistor, 47 k, 1/4 W, 5%	R0777
R10	Resistor, 100 k, 1/4 W, 5%	R0741
R11	Resistor, 180 Ω, 1/4 W, 5%	R1233
R12	Resistor, 10 k, 1/4 W, 5%	R0766
R13	Resistor, 10 k, 1/4 W, 5%	R0766
R14	Resistor, 470 Ω, 1/4 W, 5%	R0744
R15	Resistor, 47 Ω, 1/4 W, 5%	R1043
R16	Resistor, 10 k, 1/4 W, 5%	R0766
R17	Resistor, 10 k, 1/4 W, 5%	R0766
R18	Resistor, 10 k, 1/4 W, 5%	R0766
R19	Resistor, 680 Ω, 1/4 W, 5%	R1234
R20	Resistor, 15 k, 1/4 W, 5%	R0728
R21	Resistor, 10 k, 1/4 W, 5%	R0766
R22	Resistor, 220 Ω, 1/4 W, 5%	R0760

A14 (SYNTHESIZER), 100 MHz MULTIPLIER PARTS LIST (Cont'd)

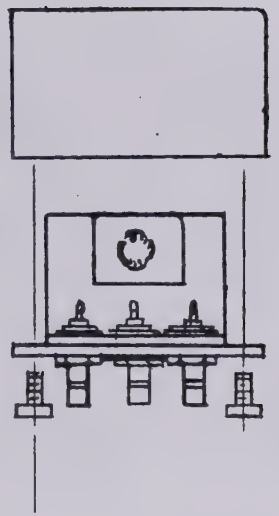
REF.	DESCRIPTION	SD PART NO.
R23	Resistor, 180 Ω, 1/4 W, 5%	R1233
R24	Resistor, 330 Ω, 1/4 W, 5%	R0662
R25	Resistor, 390 Ω, 1/4 W, 5%	R0880
R26	Resistor, 3.3 k, 1/4 W, 5%	R0742
R27	Resistor, 12 k, 1/4 W, 5%	R0759
R28	Resistor, 270 Ω, 1/4 W, 5%	R0694
R29	Resistor, 1 k, 1/4 W, 5%	R0765
U1	Integrated Circuit, MC3003P	25767
U2	Integrated Circuit, SN7473N	19709
U3	Integrated Circuit, SN7490N	19711
U4	Integrated Circuit, MC1023P	25718
U5	Integrated Circuit, MC1027P	25719
U6	Integrated Circuit, MC1013P	25716
U7	Integrated Circuit, MC1013P	25716
U8	Integrated Circuit, MC1013P	25716
	Test Point Brown	E0284

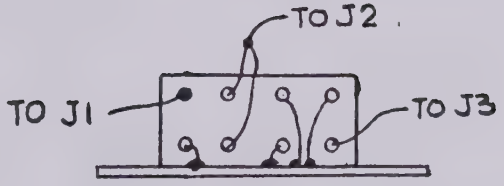


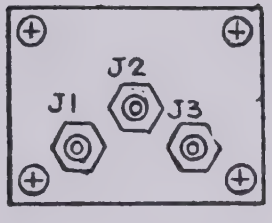
A15 (SYNTHESIZER), RF OUT ASSEMBLY 053481

A15 (SYNTHESIZER), RF OUT ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
A15	RF Out Assembly	053481A
1	Fuse Clip	X0175
2	Resistor, 47 Ω, 1/4 W, 5%	R0743
3	BNC Connector	J0260
4	Coax Connector, Min.	J0618
5	Fuse Holder	X0158
6	Fuse, 1/20 A	F0068
7	Resistor, 2.7 k, 1/2 W, 5%	R0143



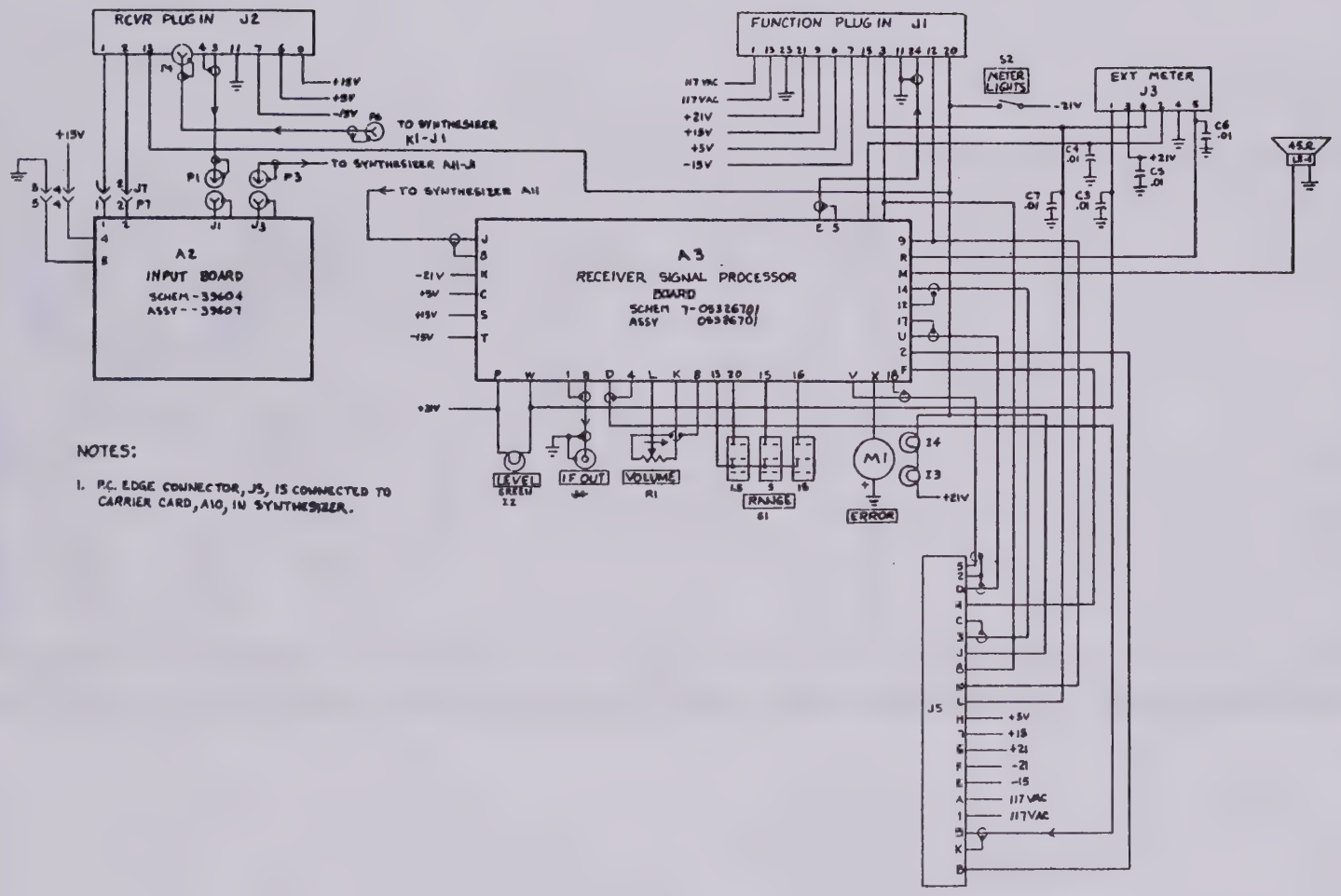




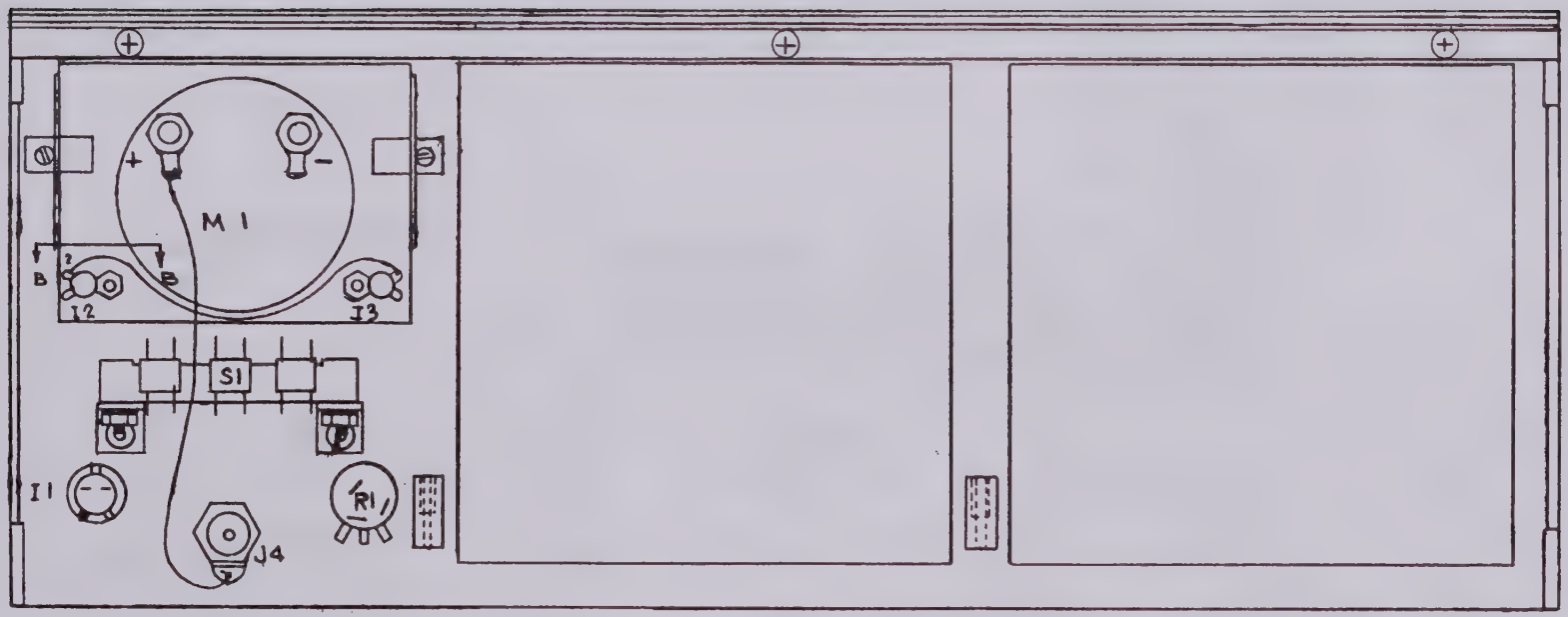
A16 (SYNTHESIZER), MIXER ASSEMBLY 053400

A16 (SYNTHESIZER) MIXER ASSEMBLY PARTS LIST

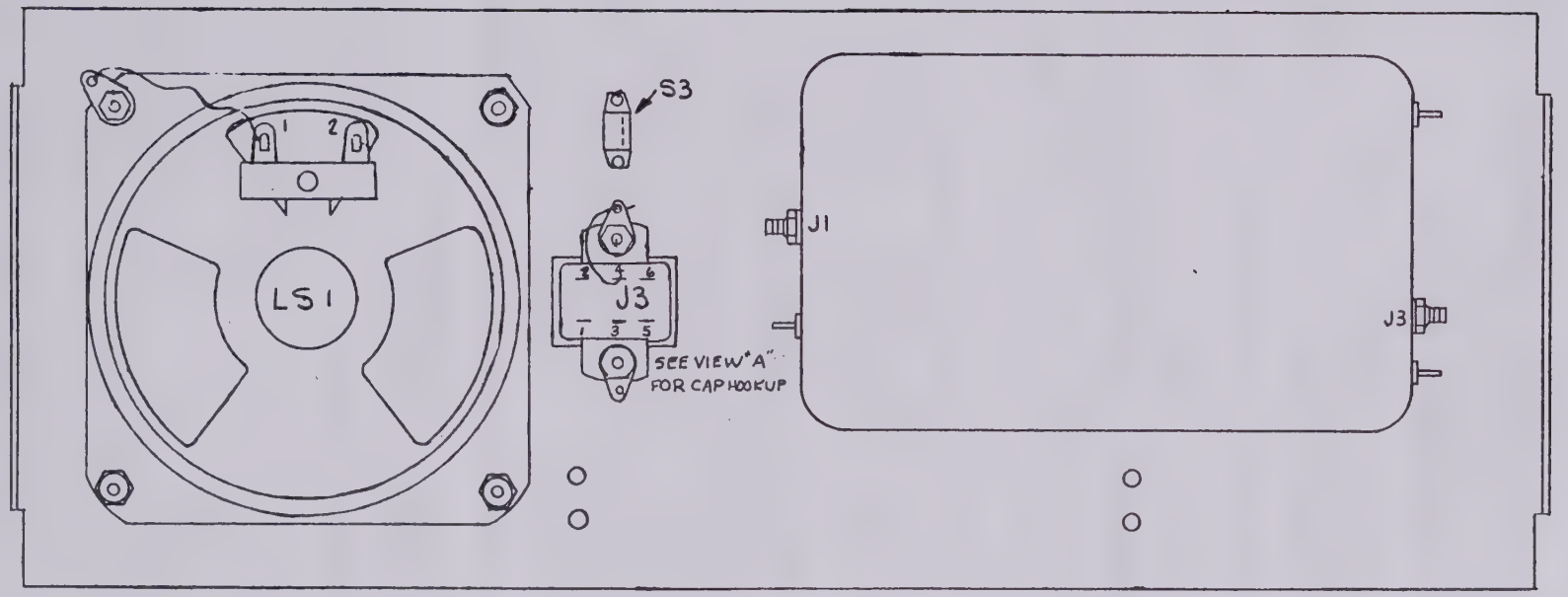
REF.	DESCRIPTION	SD PART NO.
A16	**Mixer Assembly**	053400A
	Mounting Plate, Mixer	053399
	Mixer	102815
J1	Coax Connector, Min.	J0618
J2	Coax Connector, Min.	J0618
J3	Coax Connector, Min.	J0618
	Pomona Box (Box and Cover)	053398

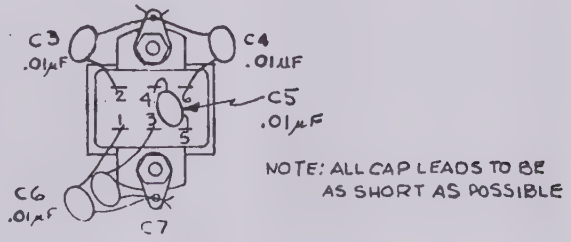


(MONITOR) BLOCK DIAGRAM 7-053518



(MONITOR) FRONT PANEL SUBASSEMBLY 053268





(MONITOR) REAR PANEL SUBASSEMBLY 053269

MONITOR, FINAL ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
1	Connector, 10 Pin (2 Row)	J0620
2	Connector, BNC	J0614
3	Connector, Gremar 8212B	J0611
4	Connector, BNC	J0633
	Front Panel Subassembly	053268B
1	Lamp Socket	X0133
R1	Potentiometer/Switch, CRL Model 3, 5 k	R2710
J4	Jack, BNC	J0260
2	Knob, Raytheon, #70-2WD-1	H1982
3	Lamp, Green, Dialco 507-3918-1472-600	I0104
S1	Pushbutton Switch	045822
M1	Meter	053001B
4	Lamp, Incandescent, (Meter)	I0100
5	Lamp, Incandescent, (Meter)	I0100
	Rear Panel Subassembly	053269B
C1	Capacitor, .01 µF, @ 100 V	C0556
C2	Capacitor, .01 µF, @ 100 V	C0556
C3	Capacitor, .01 µF, @ 100 V	C0556
C4	Capacitor, .01 µF, @ 100 V	C0556
J3	Connector, Cinch-Jones, #S-306-AB	J0619
LS1	Speaker, Quam #4A1Z45	LS0001
	Speaker Screen	39645
S2	Switch, Slide	S0356

CIRCUIT DESCRIPTION
INPUT BOARD
SCHEMATIC # 39604C
A2 (MONITOR)

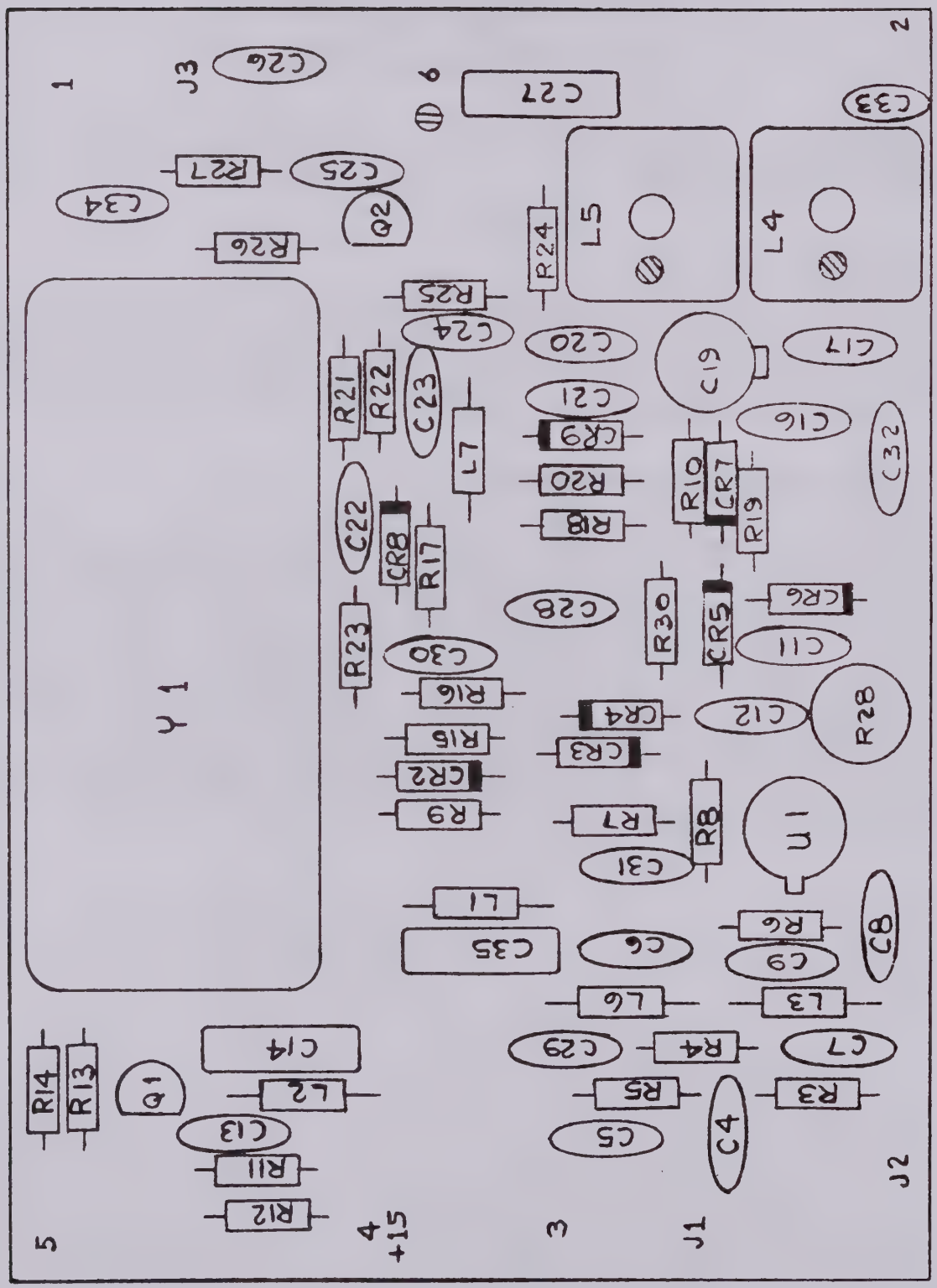
The Input Board consists of: 1) limiting amplifier; and 2) a dual-bandwidth filter system.

1) LIMITING AMPLIFIER

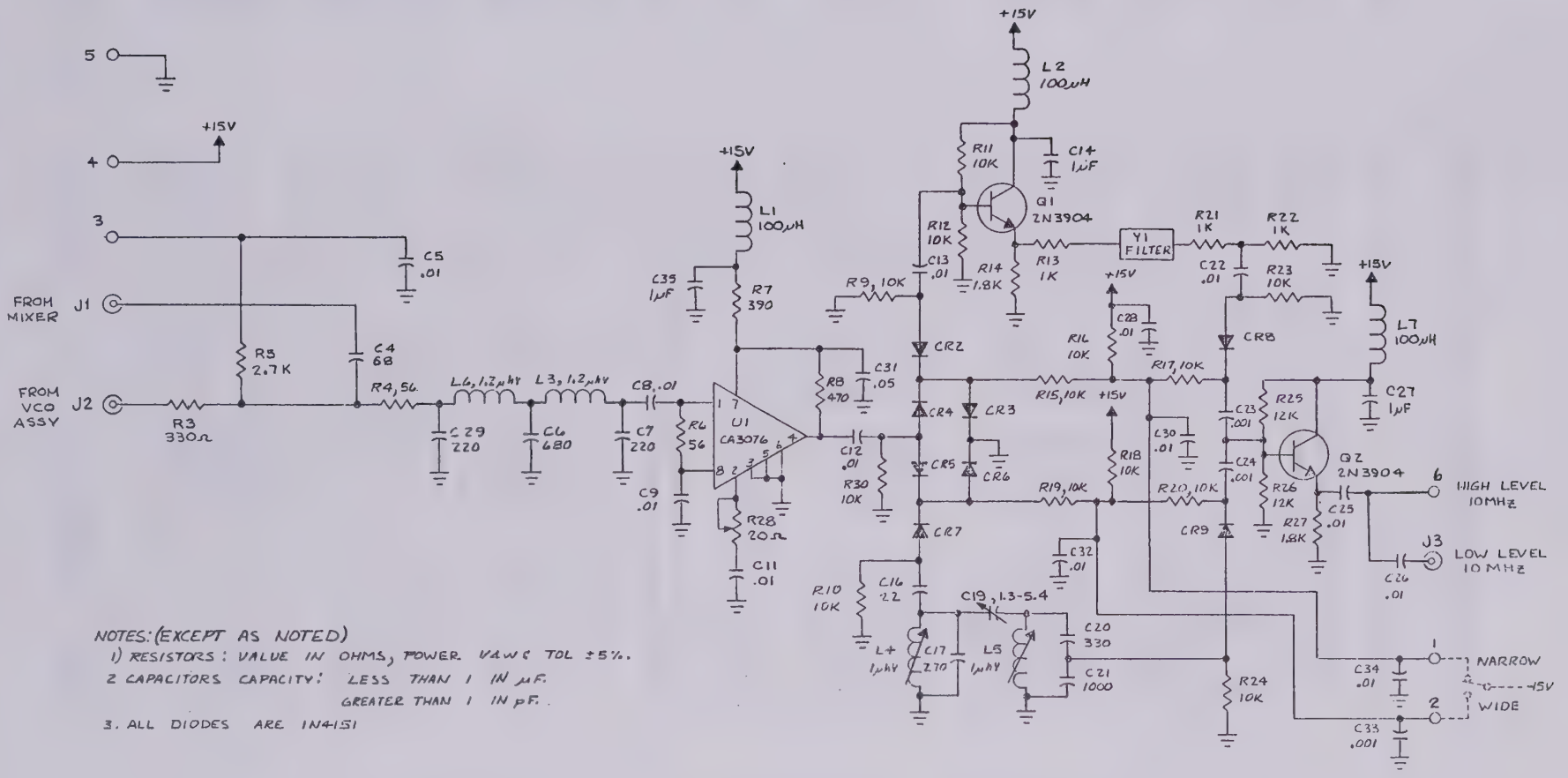
Input to the amplifier is filtered by C29, L6, C6, L3, and C7 to remove any frequencies above 10 MHz. The resulting 10 MHz IF signal is amplified by integrated circuit U1. This I.C. is a limiting-type amplifier and provides a nearly constant output level once a certain input level is reached.

2) DUAL-BANDWIDTH FILTER SYSTEM

Diodes CR2 - CR7 and CR8, CR9 provide switching to select either the wide or narrow modes. Switching the front-panel WIDE/NARROW switch to WIDE, forward-biases diodes CR5, CR7, and CR9; at the same time, diode CR6 is reverse-biased. This permits the output from U1 to pass through the tuned network composed of C16, L4, C17, C19, L5, C20, and C21. The bandwidth of this circuit is approximately 200 kHz at the 3 dB points. Switching the front panel WIDE/NARROW switch to NARROW, forward-biases diodes CR2, CR4 and CR8, and reverse-biases CR3. The signal from U1 now is buffered by Q1 and passes through crystal filter Y1. This filter has a 3 dB bandwidth of about 16 kHz and a 60 dB bandwidth of about 36 kHz. Buffer Q2 provides a low-impedance source for the 10 MHz IF lines.



A2 (MONITOR), INPUT BOARD ASSEMBLY 39607



NOTES: (EXCEPT AS NOTED)

1) RESISTORS: VALUE IN OHMS, POWER VALUE TOL ±5%.
2 CAPACITORS CAPACITY: LESS THAN 1 IN μF.
GREATER THAN 1 IN pF.
3. ALL DIODES ARE IN4151

A2 (MONITOR), INPUT BOARD SCHEMATIC 039604

A2 (MONITOR), INPUT BOARD PARTS LIST

REF.	DESCRIPTION	SD PART NO.
A2	Input Board Assembly	39607E
A2	Input Board Schematic	39604C
C1	Not Used	
C2	Not Used	
C3	Not Used	
C4	Capacitor, 68 pF, DM	C0635
C5	Capacitor, .01 µF, Disc	C0562
C6	Capacitor, 680 pF, DM	C0638
C7	Capacitor, 220 pF, DM	C0538
C8	Capacitor, .01 µF, Disc	C0562
C9	Capacitor, .01 µF, Disc	C0562
C10	Not Used	
C11	Capacitor, .01 µF, Disc	C0562
C12	Capacitor, .01 µF, Disc	C0562
C13	Capacitor, .01 µF, Disc	C0562
C14	Capacitor, .1 µF, 25 V	C0879
C15	Not Used	
C16	Capacitor, 22 pF, DM	C0529
C17	Capacitor, 270 pF, CM	C0539
C18	Not Used	
C19	Capacitor, Trim, 1.3-5.4 pF	C1254
C20	Capacitor, 330 pF, DM	C0540
C21	Capacitor, 1000 pF, DM	C0543
C22	Capacitor, .01 µF, Disc	C0562
C23	Capacitor, .001 µF, Disc	C0424
C24	Capacitor, .001 µF, Disc	C0424
C25	Capacitor, .01 µF, Disc	C0562
C26	Capacitor, .01 µF, Disc	C0562
C27	Capacitor, .01 µF, Disc	C0562
C28	Capacitor, .01 µF, Disc	C0562
C29	Capacitor, 220 pF, DM	C0528
C30	Capacitor, .01 µF, Disc	C0562
C31	Capacitor, .05 µF, 12 V, Disc	C0672
C32	Capacitor, .01 µF, Disc	C0562
C33	Capacitor, .001 µF	C1155
C34	Capacitor, .01 µF, Disc	C0562
C35	Capacitor, .01 µF, Disc	C0562
CR1	Not Used	
CR2	Diode, 1N4151	CR0150
CR3	Diode, 1N4151	CR0150

A2 (MONITOR), INPUT BOARD PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
CR4	Diode, 1N4151	CR0150
CR5	Diode, 1N4151	CR0150
CR6	Diode, 1N4151	CR0150
CR7	Diode, 1N4151	CR0150
CR8	Diode, 1N4151	CR0150
CR9	Diode, 1N4151	CR0150
L1	Inductor, 100 µH	L0073
L2	Inductor, 100 µH	L0073
	Coil Form	E0304
L3	Inductor, 1/2 µH	L0173
L4	Inductor, 1 µH	39666-2
	Coil Form	E0304
L5	Inductor, 1 µH	39666-2
	Coil Form	E0304
L6	Inductor, 1/2 µH	L0173
L7	Inductor, 100 µH	L0073
Q1	Transistor, 2N3904	Q0247
Q2	Transistor, 2N3904	Q0247
R1	Not Used	
R2	Not Used	
R3	Resistor, 330 Ω, 1/4 W, 5%	R0662
R4	Resistor, 56 Ω, 1/4 W, 5%	R1554
R5	Resistor, 2.7 k, 1/4 W, 5%	R0937
R6	Resistor, 56 Ω, 1/4 W, 5%	R1554
R7	Resistor, 390 Ω, 1/4 W, 5%	R0880
R8	Resistor, 470 Ω, 1/4 W, 5%	R1044
R9	Resistor, 10 k, 1/4 W, 5%	R0766
R10	Resistor, 10 k, 1/4 W, 5%	R0766
R11	Resistor, 10 k, 1/4 W, 5%	R0766
R12	Resistor, 10 k, 1/4 W, 5%	R0766
R13	Resistor, 1 k, 1/4 W, 5%	R0765
R14	Resistor, 1.8 k, 1/4 W, 5%	R0959
R15	Resistor, 10 k, 1/4 W, 5%	R0766
R16	Resistor, 10 k, 1/4 W, 5%	R0766
R17	Resistor, 10 k, 1/4 W, 5%	R0766
R18	Resistor, 10 k, 1/4 W, 5%	R0766
R19	Resistor, 10 k, 1/4 W, 5%	R0766
R20	Resistor, 10 k, 1/4 W, 5%	R0766
R21	Resistor, 1 k, 1/4 W, 5%	R0765
R22	Resistor, 1 k, 1/4 W, 5%	R0765

A2 (MONITOR), INPUT BOARD PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R23	Resistor, 10 k, 1/4 W, 5%	R0766
R24	Resistor, 10 k, 1/4 W, 5%	R0766
R25	Resistor, 12 k, 1/4 W, 5%	R0759
R26	Resistor, 12 k, 1/4 W, 5%	R0759
R27	Resistor, 1.8 k, 1/4 W, 5%	R0959
R28	Resistor, 20 Ω, Potentiometer	R2923
R29	Not Used	
R30	Resistor, 10 k, 1/4 W, 5%	R0766
U1	Integrated Circuit, CA3076	25770
Y1	Crystal Filter, 10 MHz Center	Y0049

CIRCUIT DESCRIPTION
RECEIVER SIGNAL PROCESSOR
SCHEMATIC #7-05326701A
A3 (MONITOR)

Four basic functions are performed by the Receiver Signal Processor Board (Refer to Figure A3.1, Receiver Signal Processor Block Diagram and schematic #7-05326701): 1) The 10 MHz IF from the Input Board or the 10 MHz from the VCO Board is selected and distributed to the function plug-ins (see Standard and Option Plug-ins, Chapter 6) and the IF OUT connector; 2) The input signal amplitude is sensed to determine if sufficient level is present (a) to activate the audio circuit and deviation meter, and (b) to provide dc signals to operate the INPUT LEVEL lamp and to enable the function plug-ins; 3) The FM signal is demodulated and amplified providing audio signal to the speaker; and 4) An accurate ±dc error voltage, developed by a digital-type discriminator referenced to the 1 MHz time-base, is fed to the deviation meter, function plug-ins, and VCO control.

1) INPUT SELECT AND LEVEL DETECT AMPLIFIER

The Input Select and Level Detect Amplifier (Q1-Q8) selects the input dictated by Synthesizer function selector switch; i.e. 10 MHz IF signal from the Input Board with the switch in the RCVR mode, or 10 MHz from the VCO Board with the switch in the FM mode. The selected 10 MHz signal is amplified and supplied to the two function plug-ins, the front panel IF OUT connector, the Audio Discriminator and Count Up/Down and Select Gates circuits.

2) COUNT UP/DOWN AND SELECT GATES

The reference signal for the Count Up/Down and Select Gates (U2, U8-1, U9, U10, and U11) is the precision 100 ms square wave derived from the Time Base Divider Board A1. This circuit gates and loads the Presettable Up/Down Counter (U3-U7), supplies two pulses of width proportional to frequency error and reset pulses to the Integrator section of the Integrate and Store circuit, gates the Store section of the same circuit, and detects the direction of the frequency error (high or low) as compared to the selected frequency.

3) INTEGRATE AND STORE

The Integrate and Store circuit (U12-U15, U10 and Q9-Q13) develops a ripple-free dc voltage proportional to the width of the pulse supplied by the Select Gates section of the Count Up/Down and Select Gates circuit.

4) REVERSING SWITCH

The Reversing Switch (Q14, Q15, U16 and U18) is an electronic switch; it inverts the output of the Integrator and Store circuit when the "Frequency Hi/Lo" signal from the Count Up/Down and Select Gates

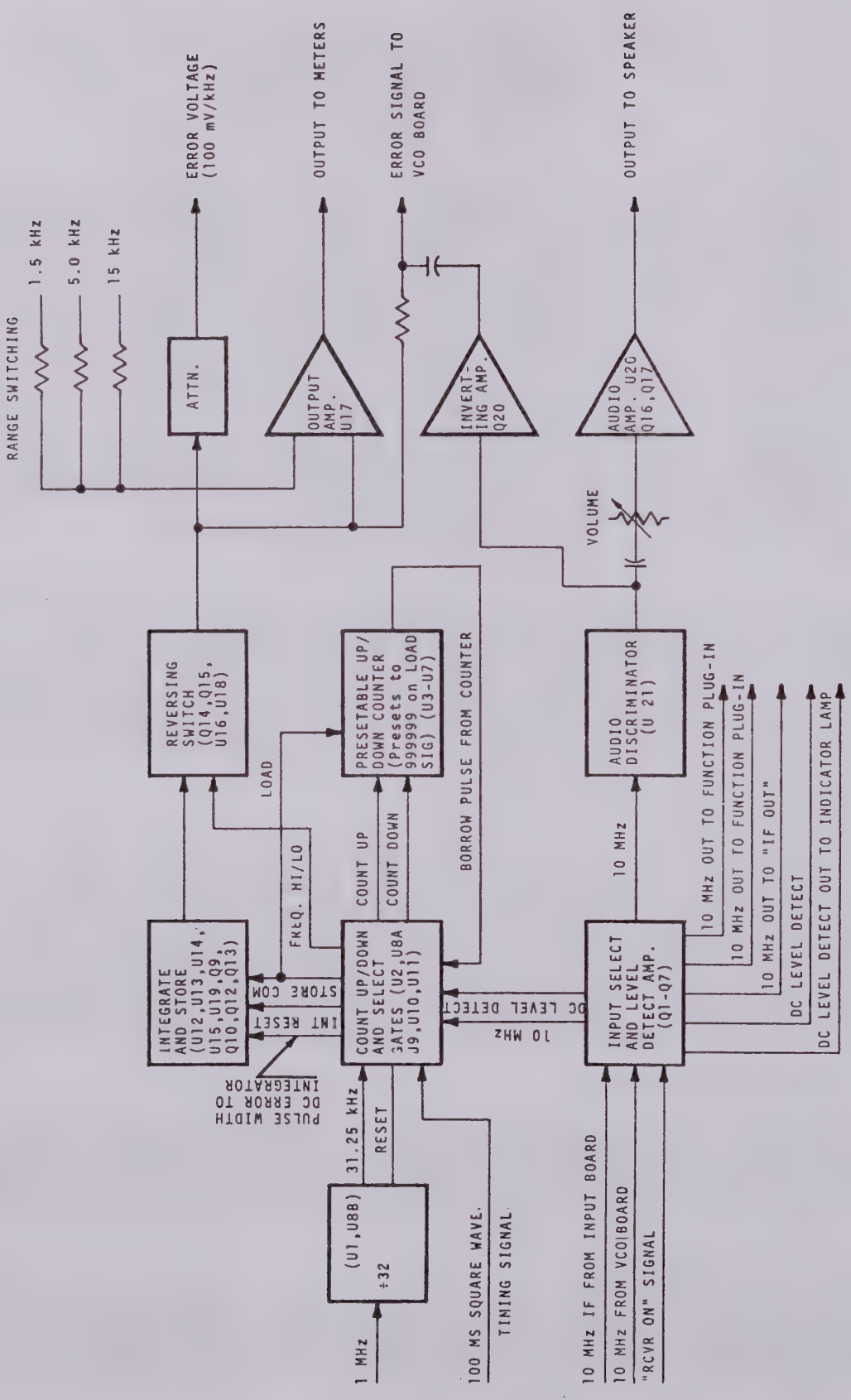


FIGURE A3.1, RECEIVER SIGNAL PROCESSOR - BLOCK DIAGRAM

circuit is high.

5) OUTPUT AMPLIFIER

The Output Amplifier circuit (U17) provides range switching (shown on block diagram), calibration and drive signals to the panel and remote meters.

6) AUDIO DISCRIMINATOR

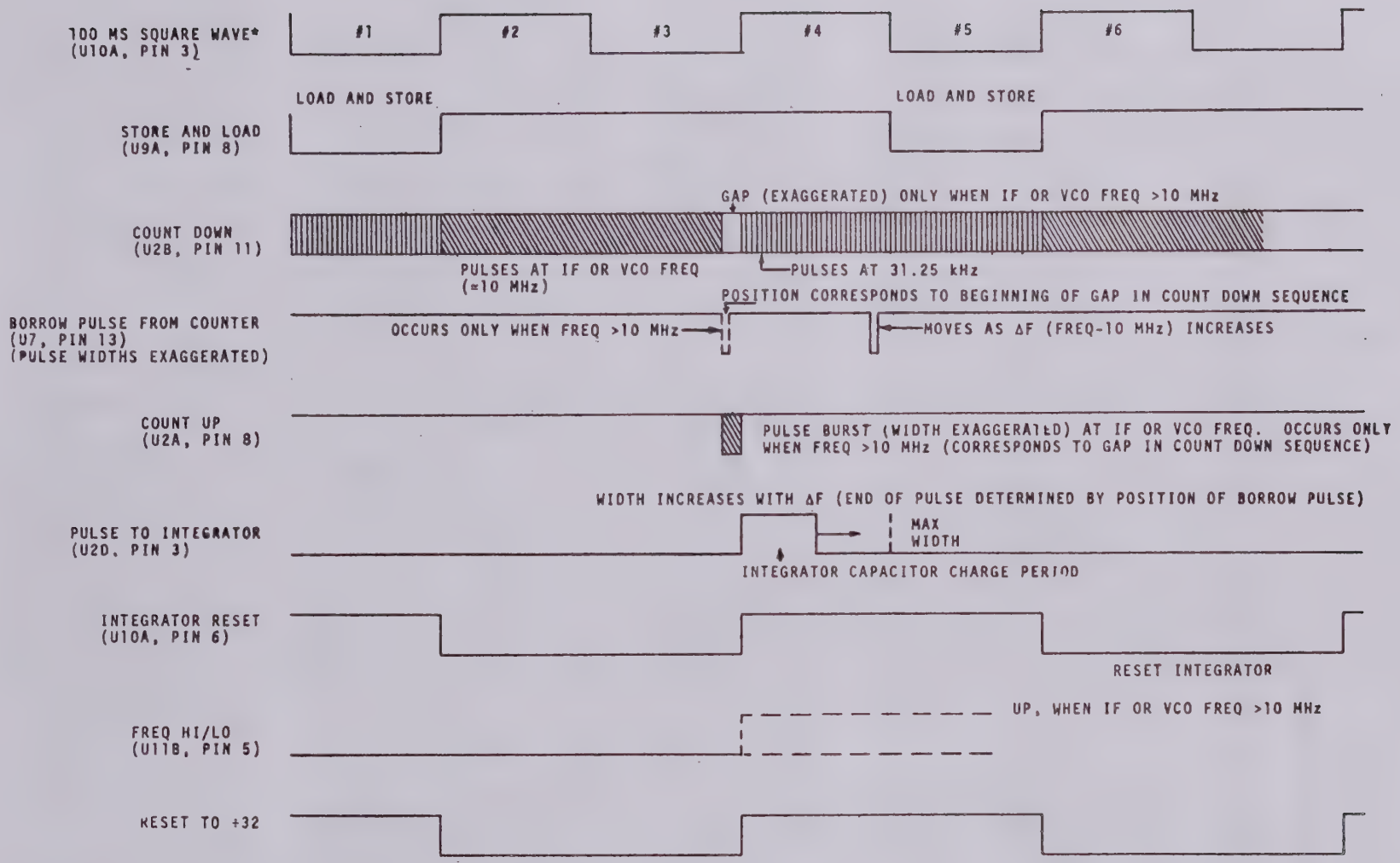
The Audio Amplifier (U20, Q16, and Q17) and the Inverting Amplifier (Q20) are driven by the digital Audio Discriminator (U21). The Inverting Amplifier adds high frequency components to the output of the Audio Discriminator; the resulting output controls the 10 MHz VCO (A11) circuits.

The sequence of operation of the Receiver Signal Processor is as described herein. (Refer to Figure A3.1, Receiver Signal Processor - Block Diagram, and Figure A3.2, Receiver Signal Processor - Timing Diagram).

During half cycle #1 of the 100 ms square wave (U10-3), a "Load and Store" pulse is initiated (U9-8) allowing the counter of the Presettable Up/Down Counter circuit to preset to 999999 (the counter is preset to 999999 instead of 1,000,000 because of the loss of the first pulse inherent with the 0.1 sec. gating operation); also, any voltage existing at the integrator output of the Integrate and Store circuit is stored and applied to the Reversing Switch circuit as well.

At the start of half cycle #2, the 10 MHz signal to be measured is applied to the "Count Down" input (U2-11) of the Count Up/Down and Select Gates circuit until (a) the end of half cycle #3 turns gate U2-11 off, or (b) the counter (Presettable Up/Down Counter circuit) reaches zero and a "borrow" pulse is received from the counter (U7-13). The "borrow" pulse allows the gates of the Count Up/Down and Select Gates circuit to switch the 10 MHz signal to the "Count Up" (U2-8) input until the end of the half cycle #3; a "borrow" pulse occurring during this interval of the operating sequence also causes the FREQ HI/LO output of the Count Up/Down and Select Gates circuit to go high at the end of half cycle #3. In either case (a) or (b) the number which remains in the counter times 10 (due to the 0.1 sec. gate time) is equal to the input frequency error.

The beginning of half cycle #4 will initiate a pulse to the integrator (U2-8) only if the counter is not at zero count; simultaneously, the "Reset" signal is removed from the ÷32 circuit, and the resulting 31.25 kHz from this circuit is applied to the "Count Down" input of the Presettable Up/Down Counter circuit. Hence, if the counter is not at zero count and the count number remaining in the counter is not too high, the counter starts counting down to zero and initiates a "borrow" pulse which ends the pulse to the integrator; thus, a pulse having a width proportional to frequency error is generated and integrated.

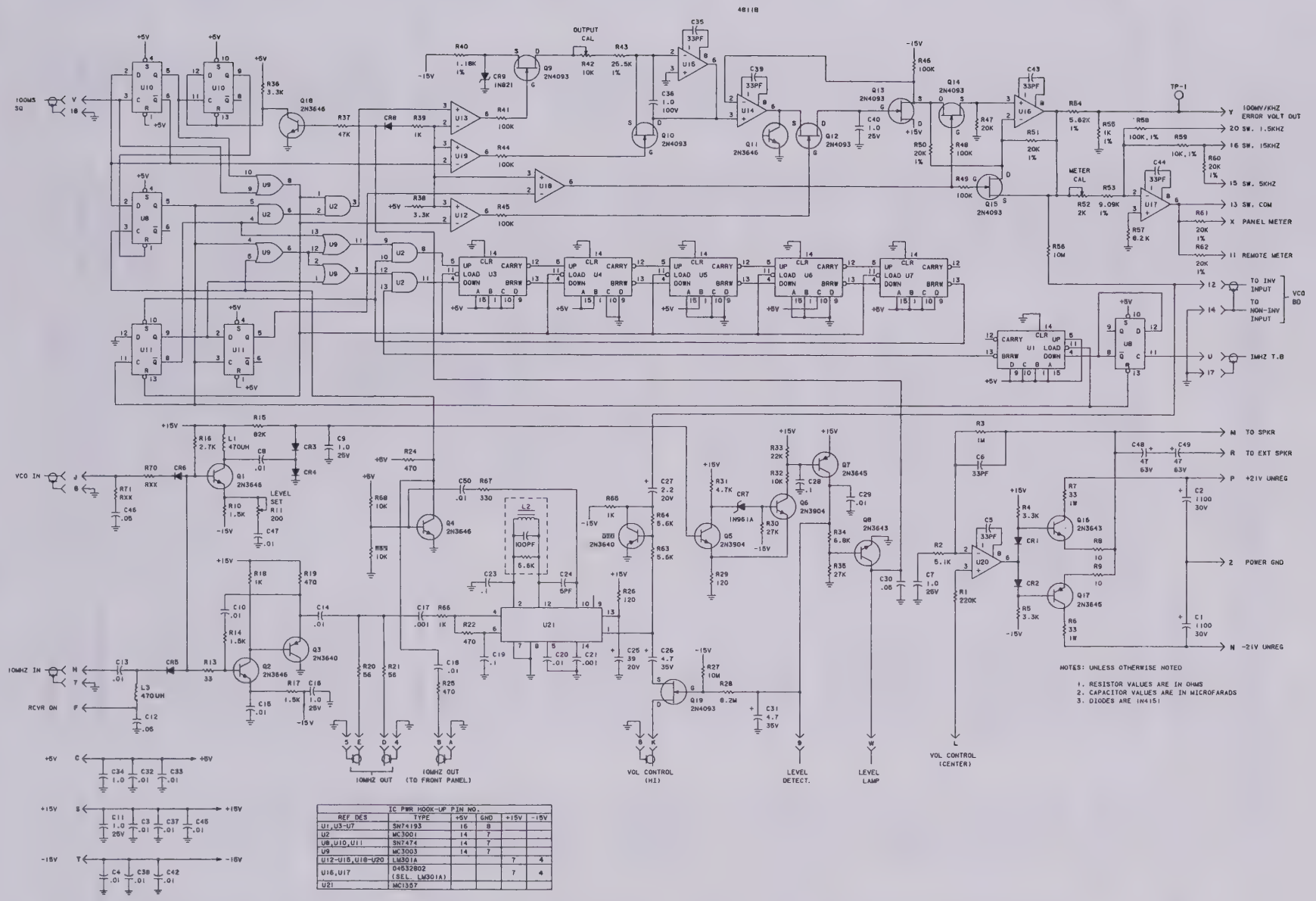


* The half cycles of the 100 ms square wave are numbered for reference purpose only.

FIGURE A3.2, RECEIVER SIGNAL PROCESSOR - TIMING DIAGRAM

Half cycle #5 initiates a new "Load and Store" pulse; the integrator output is stored while the counter is reset and loaded. Half cycle #6 ends the store cycle, holding the output voltage of the Integrate and Store circuit while the integrator is reset and the counter begins a new "Count Down" cycle. Note that the maximum width of the pulse to the integrator (U2-3) is limited to one half (1/2) cycle of the 100 ms square wave. Although the 31.25 kHz is supplied to the "Count Down" input of the counter for a whole cycle of the 100 ms square wave, the counter ceases to operate during the "Load and Store" pulse. The "Load and Store" pulse also terminates the pulse to the integrator when no "borrow" pulse is first received.

A3 (MONITOR), RECEIVER SIGNAL PROCESSOR BOARD ASSEMBLY 05326701



IC PWR HOOK-UP PIN NO.					
REF DES	TYPE	+5V	GND	+15V	-15V
U1,U3-U7	SN74193	16	8		
U2	MC3001	14	7		
U8,U10,U11	SN7474	14	7		
U9	MC3003	14	7		
U12-U15,U18-U20	LM301A			7	4
U16,U17	04532802 (SEL. LM301A)			7	4
U21	MC1357				

A3 (MONITOR), RECEIVER SIGNAL PROCESSOR SCHEMATIC 05326701

A3 (MONITOR), RECEIVER SIGNAL PROCESSOR PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Receiver Signal Processor Assembly	05326701A
	Receiver Signal Processor Schematic	7-05326701A
C1	Capacitor, 1100 µF, 30 V, EL AX	C1162
C2	Capacitor, 1100 µF, 30 V, EL AX	C1162
C3	Capacitor, .01 µF, 100 V, Disc	C0556
C4	Capacitor, .01 µF, 100 V, Disc	C0556
C5	Capacitor, 33 pF, 500 V, Mica	C0531
C6	Capacitor, 33 pF, 500 V, Mica	C0531
C7	Capacitor, 1 µF, 25 V, Disc	C0879
C8	Capacitor, ,01 µF, 100 V, Disc	C0556
C9	Capacitor, 1 µF, 25 V, Disc	C0879
C10	Capacitor, .01 µF, 100 V, Disc	C0556
C11	Capacitor, 1 µF, 25 V, Disc	C0879
C12	Capacitor, .05 µF, 10 V, Disc	C0672
C13	Capacitor, .01 µF, 100 V, Disc	C0556
C14	Capacitor, .01 µF, 100 V, Disc	C0556
C15	Capacitor, .01 µF, 100 V, Disc	C0556
C16	Capacitor, 1 µF, 25 V, Disc	C0879
C17	Capacitor, 1000 pF, 50 V, Mold	C1155
C18	Capacitor, .01 µF, 100 V, Disc	C0556
C19	Capacitor, .1 µF, 10 V, Disc	C0661
C20	Capacitor, .01 µF, 100 V, Disc	C0556
C21	Capacitor, 1000 pF, 50 V, Mold	C1155
C22	Not Used	
C23	Capacitor, .1 µF, 10 V, Disc	C0661
C24	Capacitor, 5 pF, 500 V, Mica	C1071
C25	Capacitor, 39 µF, 20 V, Tant	03279750
C26	Capacitor, 4.7 µF, 35 V, Tant	C0406
C27	Capacitor, 2.2 µF, 20 V, Tant	C1009
C28	Capacitor, .1 µF, 10 V, Disc	C0661
C29	Capacitor, .01 µF, 100 V, Disc	C0556
C30	Capacitor, .05 µF, 10 V, Disc	C0672
C31	Capacitor, 4.7 µF, 35 V, Tant	C0406
C32	Capacitor, .01 µF, 100 V, Disc	C0556
C33	Capacitor, .01 µF, 100 V, Disc	C0556
C34	Capacitor, 1 µF, 25 V, Disc	C0879
C35	Capacitor, 33 pF, 500 V, Mica	C0531
C36	Capacitor, 1 µF, Poly Carb	C1300
C37	Capacitor, .01 µF, 100 V, Disc	C0556
C38	Capacitor, .01 µF, 100 V, Disc	C0556

A3 (MONITOR), RECEIVER SIGNAL PROCESSOR PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
C39	Capacitor, 33 pF, 500 V, Mica	C0531
C40	Capacitor, 1 µF, 25 V, Disc	C0879
C41	Not Used	
C42	Capacitor, .01 µF, 100 V, Disc	C0556
C43	Capacitor, 33 pF, 500 V, Mica	C0531
C44	Capacitor, 33 pF, 500 V, Mica	C0531
C45	Capacitor, .01 µF, 100 V, Disc	C0556
C46	Capacitor, .05 µF, 10 V, Disc	C0672
C47	Capacitor, .01 µF, 100 V, Disc	C0556
C48	Capacitor, 47 µF, 63 V, EL AX	0329200
C49	Capacitor, 47 µF, 63 V, EL AX	0329200
C50	Capacitor, .01 µF, 100 V, Disc	C0556
CR1	Diode, 1N4151	CR0150
CR2	Diode, 1N4151	CR0150
CR3	Diode, 1N4151	CR0150
CR4	Diode, 1N4151	CR0150
CR5	Diode, 1N4151	CR0150
CR6	Diode, 1N4151	CR0150
CR7	Diode, 1N961A	CR0201
CR8	Diode, 1N4151	CR0150
CR9	Diode, 1N821	CR0068
L1	Inductor, 470 µH, WEE-WEE	L0157
L2	Inductor, Assembly Shield Coil Form	053408
L3	Inductor, 470 µH, WEE-WEE	L0157
Q1	Transistor, 2N3646	Q0218
Q2	Transistor, 2N3646	Q0218
Q3	Transistor, 2N3640	Q0178
Q4	Transistor, 2N3646	Q0218
Q5	Transistor, 2N3904	Q0247
Q6	Transistor, 2N3904	Q0247
Q7	Transistor, 2N3645	Q0215
Q8	Transistor, 2N3643	Q0179
Q9	Transistor, 2N4093	Q0301
Q10	Transistor, 2N4093	Q0301
Q11	Transistor, 2N3646	Q0218
Q12	Transistor, 2N4093	Q0301
Q13	Transistor, 2N4093	Q0301
Q14	Transistor, 2N4093	Q0301
Q15	Transistor, 2N4093	Q0301
Q16	Transistor, 2N3643	Q0179

A3 (MONITOR), RECEIVER SIGNAL PROCESSOR PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
Q17	Transistor, 2N3645	Q0215
Q18	Transistor, 2N3646	Q0218
Q19	Transistor, 2N4093	Q0301
Q20	Transistor, 2N3640	Q0178
R1	Resistor, 220 k 5%, 1/4 W	R0967
R2	Resistor, 5.1 k 5%, 1/4 W	R0693
R3	Resistor, 1 M 5%, 1/4 W	R0962
R4	Resistor, 3.3 k 5%, 1/4 W	R0742
R5	Resistor, 3.3 k 5%, 1/4 W	R0742
R6	Resistor, 33 Ω 5%, 1 W	R2272
R7	Resistor, 33 Ω 5%, 1 W	R2272
R8	Resistor, 10 Ω 5%, 1/4 W	R0739
R9	Resistor, 10 Ω 5%, 1/4 W	R0739
R10	Resistor, 1.5 k 5%, 1/4 W	R0783
R11	Resistor, 200 Ω , Potentiometer, 15 turn	R2722
R12	Not Used	
R13	Resistor, 33 Ω 5%, 1/4 W	R1550
R14	Resistor, 1.5 k 5%, 1/4 W	R0783
R15	Resistor, 82 k 5%, 1/4 W	R0784
R16	Resistor, 2.7 k 5%, 1/4 W	R0937
R17	Resistor, 1.5 k 5%, 1/4 W	R0783
R18	Resistor, 1 k 5%, 1/4 W	R0765
R19	Resistor, 470 Ω 5%, 1/4 W	R1044
R20	Resistor, 56 Ω 5%, 1/4 W	R1554
R21	Resistor, 56 Ω 5%, 1/4 W	R1554
R22	Resistor, 470 Ω 5%, 1/4 W	R1044
R23	Not Used	
R24	Resistor, 470 Ω 5%, 1/4 W	R1044
R25	Resistor, 470 Ω 5%, 1/4 W	R1044
R26	Resistor, 120 Ω 5%, 1/4 W	R1461
R27	Resistor, 10 M 5%, 1/4 W	R0758
R28	Resistor, 8.2 M 5%, 1/4 W	R1619
R29	Resistor, 120 Ω 5%, 1/4 W	R1461
R30	Resistor, 27 k 5%, 1/4 W	R0824
R31	Resistor, 4.7 k 5%, 1/4 W	R0892
R32	Resistor, 10 k 5%, 1/4 W	R0766
R33	Resistor, 22 k 5%, 1/4 W	R0768
R34	Resistor, 6.8 k 5%, 1/4 W	R0696
R35	Resistor, 27 k 5%, 1/4 W	R0824
R36	Resistor, 3.3 k 5%, 1/4 W	R0742

A3 (MONITOR), RECEIVER SIGNAL PROCESSOR PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R37	Resistor, 47 k 5%, 1/4 W	R0777
R38	Resistor, 3.3 k 5%, 1/4 W	R0742
R39	Resistor, 1 k 5%, 1/4 W	R0765
R40	Resistor, 1.18 k 1%, 1/8 W, MF	R2881
R41	Resistor, 100 k 5%, 1/4 W	R0741
R42	Resistor, 10 k, Potentiometer	01111320
R43	Resistor, 25.5 k 1%, 1/8 W, MF	02406370
R44	Resistor, 100 k 5%, 1/4 W	R0741
R45	Resistor, 100 k 5%, 1/4 W	R0741
R46	Resistor, 100 k 5%, 1/4 W	R0741
R47	Resistor, 20 k 5%, 1/4 W	R0964
R48	Resistor, 100 k 5%, 1/4 W	R0741
R49	Resistor, 100 k 5%, 1/4 W	R0741
R50	Resistor, 20 k 1%, 1/4 W, MF	R2842
R51	Resistor, 20 k 1%, 1/4 W, MF	R2842
R52	Resistor, 2 k, Potentiometer	R2721
R53	Resistor, 9.09 k 1%, 1/8 W, MF	R2787
R54	Resistor, 5.62 k 1%, 1/8 W, MF	R2407
R55	Resistor, 1 k 1%, 1/8 W, MF	R2694
R56	Resistor, 10 M 5%, 1/4 W	R0758
R57	Resistor, 8.2 k 5%, 1/4 W	R0883
R58	Resistor, 100 k 1%, 1/8 W, MF	R2638
R59	Resistor, 10 k 1%, 1/8 W, MF	R2696
R60	Resistor, 20 k 1%, 1/4 W, MF	R2842
R61	Resistor, 20 k 1%, 1/4 W, MF	R2842
R62	Resistor, 20 k 1%, 1/4 W, MF	R2842
R63	Resistor, 5.6 k 5%, 1/4 W	R0821
R64	Resistor, 5.6 k 5%, 1/4 W	R0821
R65	Resistor, 1 k 5%, 1/4 W	R0765
R66	Resistor, 1 k 5%, 1/4 W	R0765
R67	Resistor, 330 Ω 5%, 1/4 W	R0662
R68	Resistor, 10 k 5%, 1/4 W	R0766
R69	Resistor, 10 k 5%, 1/4 W	R0766
R70	Resistor, Factory Selected (62 Ω Nominal)	RXXXX
R71	Resistor, Factory Selected (100 Ω Nominal)	RXXXX
U1	Integrated Circuit, SN74193	025763
U2	Integrated Circuit, MC3001	025740
U3	Integrated Circuit, SN74193	025763
U4	Integrated Circuit, SN74193	025763
U5	Integrated Circuit, SN74193	025763

A3 (MONITOR), RECEIVER SIGNAL PROCESSOR PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
U6	Integrated Circuit, SN74193	025763
U7	Integrated Circuit, SN74193	025763
U8	Integrated Circuit, SN7474	025241
U9	Integrated Circuit, MC3003	025767
U10	Integrated Circuit, SN7474	025241
U11	Integrated Circuit, SN7474	025241
U12	Integrated Circuit, LM301A	025745
U13	Integrated Circuit, LM301A	025745
U14	Integrated Circuit, LM301A	025745
U15	Integrated Circuit, LM301A	025745
U16	Integrated Circuit, Sel. LM301A	04532802
U17	Integrated Circuit, Sel. LM301A	04532802
U18	Integrated Circuit, LM301A	025745
U19	Integrated Circuit, LM301A	025745
U20	Integrated Circuit, LM301A	025745
U21	Integrated Circuit, MC1357P	045216
	Tie, Cable	H1104
	Test Point, Brown	E0235
	Spacer, Swage: 6-32 X 1/2	E0262

CHAPTER 6
SERVICE MONITOR PLUG-INS

6.1 INTRODUCTION

This section contains description of the various plug-in units available for the basic S1327B Service Monitor.

6.2 STANDARD PLUG-INS

The standard plug-ins shipped with the S1327B Service Monitor include:

SLN-6350A Deviation Meter Plug-in
SLN-6352A Broadband Mixer Plug-in

6.3 OPTIONAL PLUG-INS

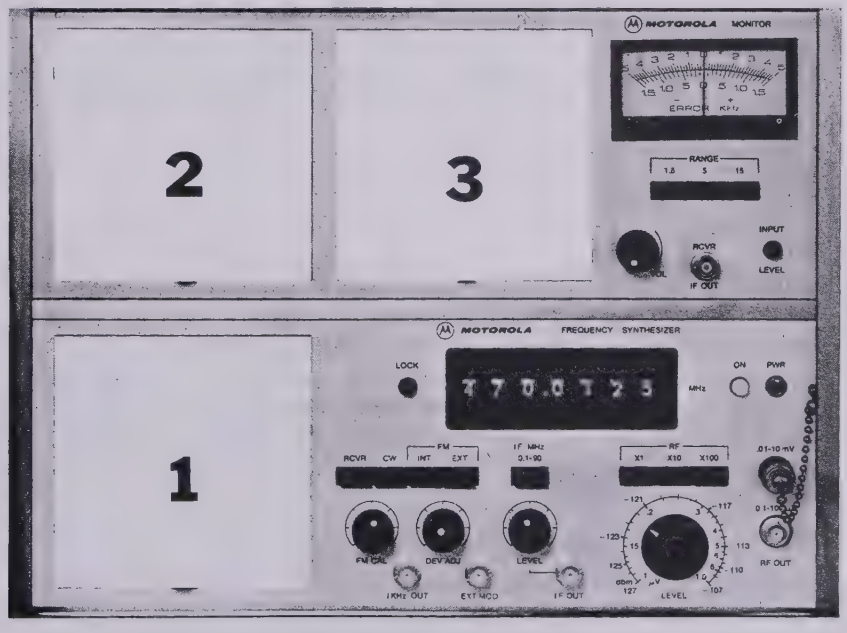
Optional plug-ins, in place of or in addition to the standard plug-ins, include the following:

SLN-6351A Deviation Oscilloscope Plug-in
SLN-6353A Preselector, 25-50 MHz Plug-in
SLN-6354A Preselector, 145-175 MHz Plug-in
SLN-6355A Preselector, 450-512 MHz Plug-in
SLN-6369A Preselector, 406-420 MHz Plug-in
SLN-6381A Audio Frequency Synthesizer Plug-in
SLN-6396A High Sensitivity Broadband Mixer Plug-in

6.4 PLUG-IN LOCATION CHART

SLN-6350A→1,2
SLN-6351A→2,1
SLN-6352A→3
SLN-6353A→3
SLN-6354A→3

SLN-6355A→3
SLN-6356A→1,2,3
SLN-6369A→3
SLN-6378A→1,2
SLN-6381A→1
SLN-6396A→3



CIRCUIT DESCRIPTION
DEVIATION METER
SCHEMATIC #39600E
MODEL SLN-6350A

The Deviation Meter circuit consists of: 1) a 10 MHz discriminator; 2) an ac-coupled amplifier; and 3) a peak and over-limit detector.

1) 10 MHz DISCRIMINATOR

The 10 MHz, low-level IF provides an input to U1, an integrated-circuit FM discriminator. Its action is basically that of a quadrature-detector with L1 and C4 providing phase shift. Power for U1 is provided from the level detect circuit. In this way, the meter will not operate until sufficient signal is present.

2) AC-COUPLED AMPLIFIER

The capacitor-coupled output from U1 feeds a two-stage amplifier via attenuator R5, R6, and R7. A polarity-reversing switch between the stages permits observation of either positive or negative deviation. The output from U3 drives peak-detector CR1. Integrating capacitor C18 and buffer Q2 provide a suitable signal for the meter readout. Provision for an external meter is included.

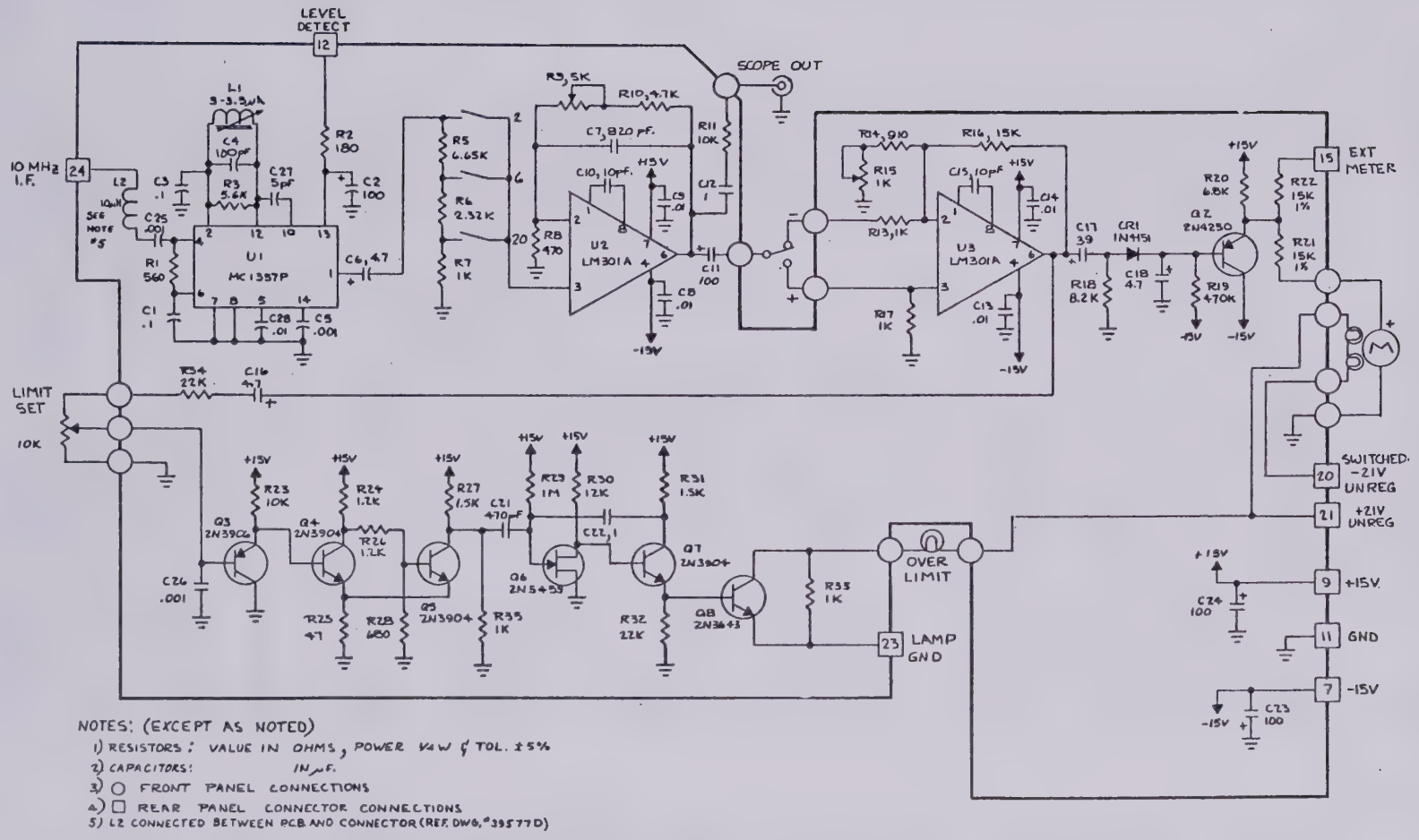
3) PEAK AND OVER-LIMIT DETECTOR

In addition to driving the peak-detector, U3 drives, via the limit-set potentiometer and buffer Q3, a Schmitt trigger circuit. This circuit (Q4 and Q5) "fires" when the input to it reaches a certain level. Its output operates a one-shot pulse generator (Q6, Q7) to provide sufficient pulse width to light the over-limit lamp. In this manner, a single peak which exceeds the limit set-point will give a visible indication.

4) CALIBRATION

A known-accuracy deviation source must be utilized. With the Deviation Meter installed, connect a signal, modulated to 5 kHz deviation, to the Monitor. Select the 6 kHz range, and - peaks. Remove the instrument top-cover and use a totally nonmetallic screwdriver, with a blade of about 3/32-inch width, to peak the meter reading by adjusting L1 (remove foam packing first, then replace). Next, adjust R9 for a 5 kHz reading. Switch to + peaks and adjust R15 for a 5 kHz reading.

SLN-6350A, DEVIATION METER P.C. ASSEMBLY 39603



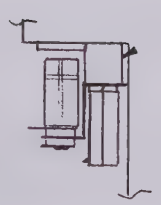
SLN-6350A, DEVIATION METER SCHEMATIC 39600

SLN-6350A, DEVIATION METER PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Deviation Meter Assembly	39603H
	Deviation Meter Schematic	39600E
C1	Capacitor, .1 µF, 10 V, Disc	C0661
C2	Capacitor, 100 µF, 25 V, Electro	C0832
C3	Capacitor, .1 µF, 10 V, Disc	C0661
C4	Capacitor, 100 pF, DM	C0874
C5	Capacitor, .001 µF, Disc	C0424
C6	Capacitor, 4.7 µF, Tant	C0406
C7	Capacitor, 820 pF, DM	C0681
C8	Capacitor, .01 µF, Disc	C0562
C9	Capacitor, .01 µF, Disc	C0562
C10	Capacitor, 10 pF, DM	C0527
C11	Capacitor, 100 µF, Tant	C0660
C12	Capacitor, 1 µF, 25 V	C0879
C13	Capacitor, .01 µF, Disc	C0562
C14	Capacitor, .01 µF, Disc	C0562
C15	Capacitor, 10 pF, DM	C0527
C16	Capacitor, 4.7 µF, Tant	C0406
C17	Capacitor, 39 µF, Tant	C0902
C18	Capacitor, 4.7 µF, Tant	C0406
C19	Capacitor, .01 µF, Disc	C0562
C20	Capacitor, .01 µF, Disc	C0562
C21	Capacitor, 470 pF, DM	C0542
C22	Capacitor, 1 µF, 25 V	C0879
C23	Capacitor, 100 µF, 25 V Electro	C0832
C24	Capacitor, 100 µF, 25 V Electro	C0832
C25	Capacitor, .001 µF, Disc	C0424
C26	Capacitor, .001 µF, Disc	C0424
C27	Capacitor, 5 pF, DM	C1071
CR1	Diode, IN4151	CR0150
L1	Inductor	039666-1
Q1	Not Used	
Q2	Transistor, 2N4250	26014430
Q3	Transistor, 2N3906	Q0248
Q4	Transistor, 2N3904	Q0247
Q5	Transistor, 2N3904	Q0247
Q6	Transistor, 2N5459	Q0264
Q7	Transistor, 2N3904	Q0247
Q8	Transistor, 2N3643	Q0179

SLN-6350A, DEVIATION METER PARTS LIST (Cont'd)

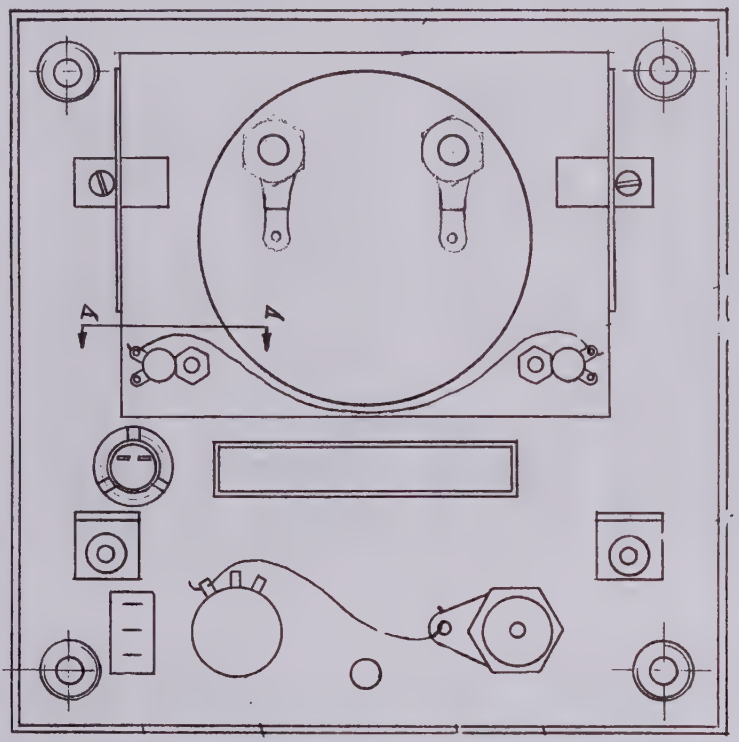
REF.	DESCRIPTION	SD PART NO.
R1	Resistor, 560 Ω, 1/4 W, 5%	R1321
R2	Resistor, 180 Ω, 1/4 W, 5%	R1233
R3	Resistor, 5.6 k, 1/4 W, 5%	R0821
R4	Not Used	
R5	Resistor, 6.65 k, 1/2 W, 1% MF	R2691
R6	Resistor, 2.32 k, 1/2 W, 1% MF	R2693
R7	Resistor, 1 k, 1/2 W, 1% MF	R2694
R8	Resistor, 470 Ω, 1/4 W, 5%	R1044
R9	Resistor, 5 k, Potentiometer	01111360
R10	Resistor, 4.7 k, 1/4 W, 5%	R0892
R11	Resistor, 10 k, 1/4 W, 5%	R0766
R12	Not Used	
R13	Resistor, 1 k, 1/4 W, 5%	R0765
R14	Resistor, 910 Ω, 1/4 W, 5%	R1795
R15	Resistor, 1 k, Potentiometer	R2816
R16	Resistor, 15 k, 1/4 W, 5%	R0728
R17	Resistor, 1 k, 1/4 W, 5%	R0765
R18	Resistor, 8.2 k, 1/4 W, 5%	R0883
R19	Resistor, 470 k, 1/4 W, 5%	R1080
R20	Resistor, 6.8 k, 1/4 W, 5%	R0696
R21	Resistor, 15 k, 1/4 W, 1% MF	R2073
R22	Resistor, 15 k, 1/4 W, 1% MF	R2073
R23	Resistor, 10 k, 1/4 W, 5%	R0766
R24	Resistor, 1.2 k, 1/4 W, 5%	R0809
R25	Resistor, 47 Ω, 1/4 W, 5%	R0743
R26	Resistor, 1.2 k, 1/4 W, 5%	R0809
R27	Resistor, 1.5 k, 1/4 W, 5%	R0783
R28	Resistor, 680 Ω, 1/4 W, 5%	R1234
R29	Resistor, 1 M, 1/4 W, 5%	R0962
R30	Resistor, 12 k, 1/4 W, 5%	R0759
R31	Resistor, 1.5 k, 1/4 W, 5%	R0783
R32	Resistor, 22 k, 1/4 W, 5%	R0768
R33	Resistor, 1 k, 1/4 W, 5%	R0765
R34	Resistor, 22 k, 1/4 W, 5%	R0768
R35	Resistor, 1 k, 1/4 W, 5%	R0765
S1	Switch, Pushbutton	045822
U1	Integrated Circuit, MC1357P	45216
U2	Integrated Circuit, LM301A	25745
U3	Integrated Circuit, LM301A	25745

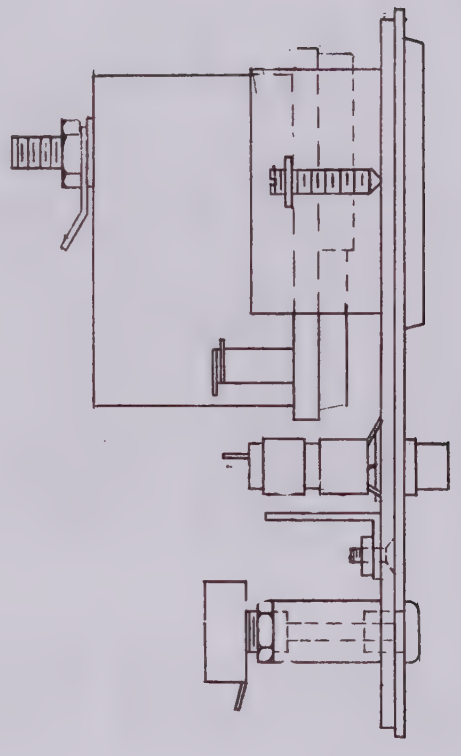


INSTALL LAMP I0100
AND REINSTALL SOCKET
IN METER

FIG 1

REMOVE STAND OFF, SPLIT LOCK & LAMP SOCKET & SEE FIG 1

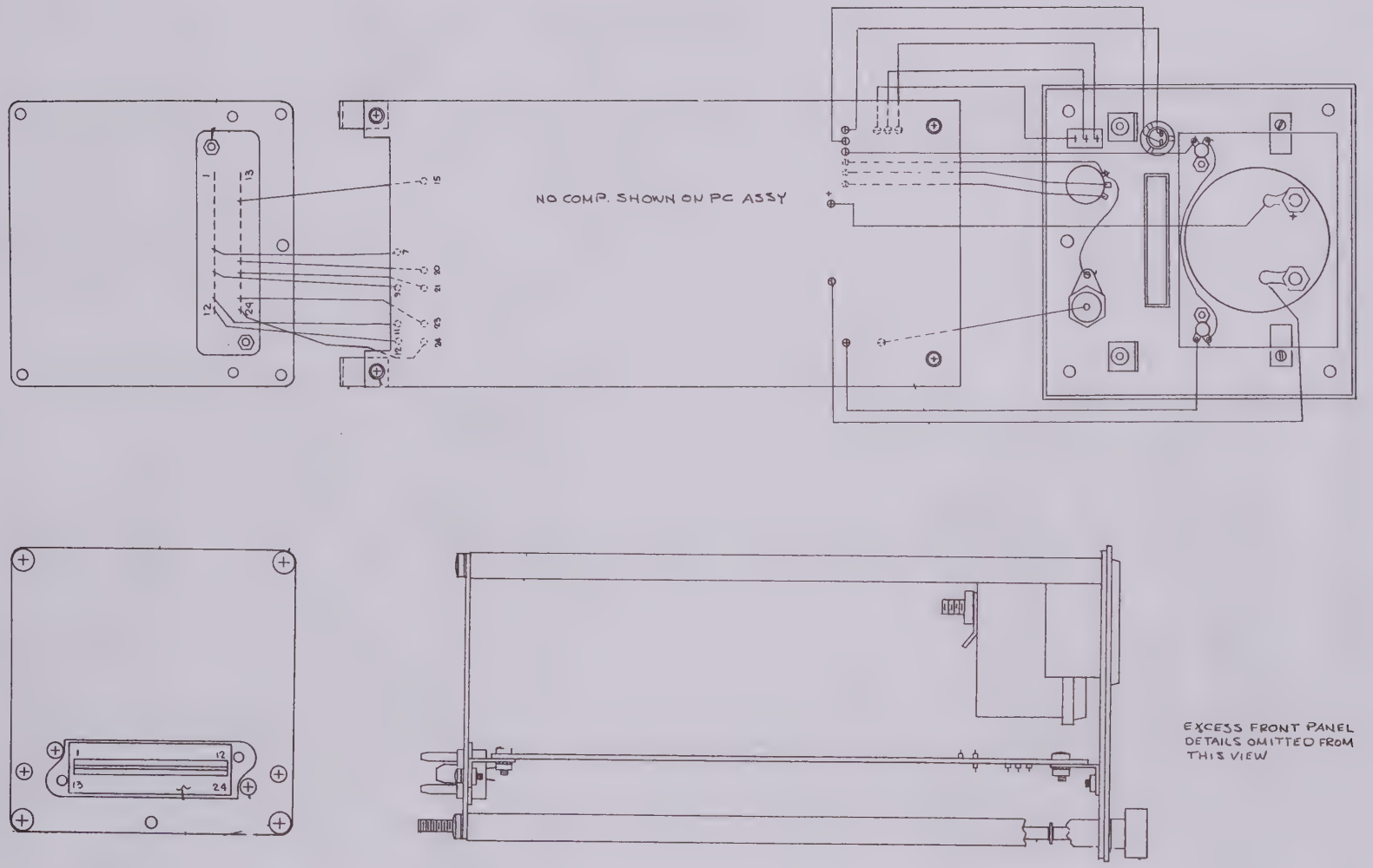




SLN-6350A, FRONT PANEL SUBASSEMBLY 39703

SLN-6350A, FRONT PANEL SUB-ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Front Panel Subassembly	39703C
1	Lamp, Incandescent, (Meter)	I0100
2	Clip	I0088
3	Lamp, Socket	X0133
4	Lamp, Incandescent, Red, 507-3918-1475-600	12013050
5	Potentiometer, 10 k, CRLJC103	R2711
6	Meter, 2BA-DUA-500-B3-KW/28	053002
7	Switch, SPDT	S0149



SLN-6350A, FINAL ASSEMBLY 39577

SLN-6350A, FINAL ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Final Assembly	39577
1	Knob	H1959
2	Rod	37340
3	Connector, 24 Pin	09061450
L2	Inductor, 10 µH	L0153

CIRCUIT DESCRIPTION
BROADBAND MIXER PLUG-IN
SCHEMATIC #39973B
MODEL SLN-6352A

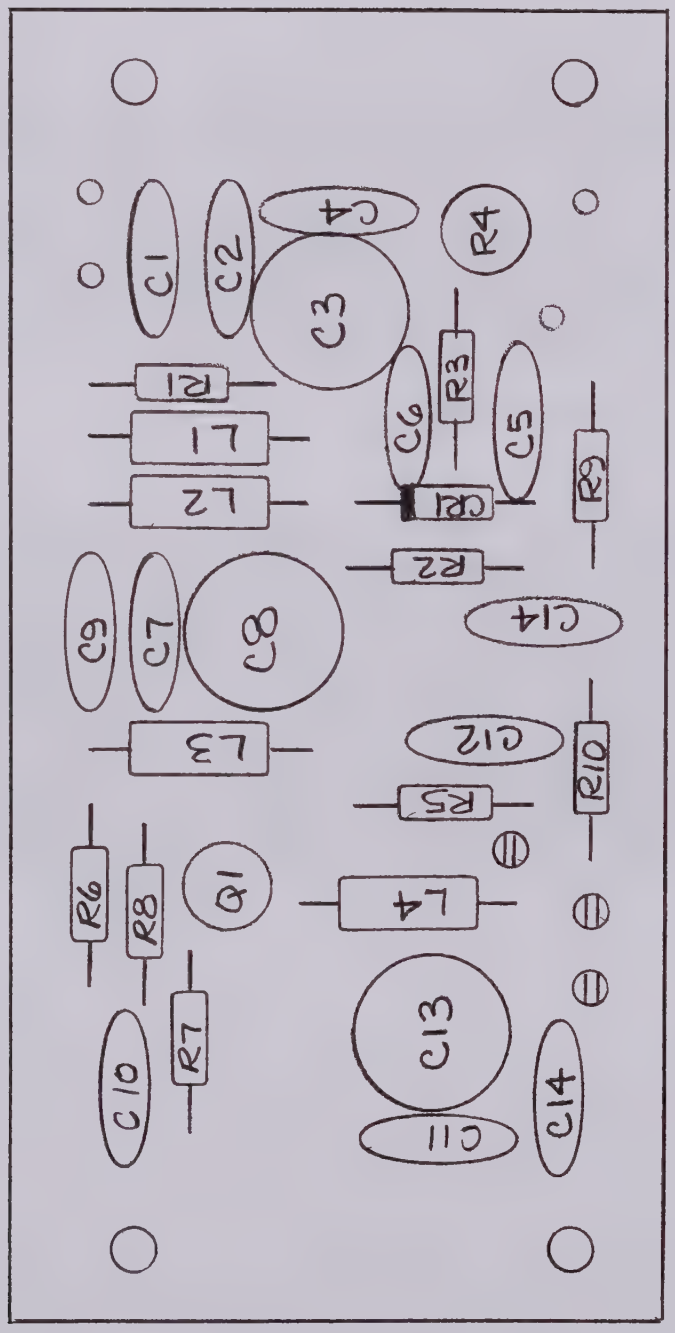
1) GENERAL

The Mixer plug-in contains a diode mixer and a low-gain IF amplifier. Its function permits the receiver to be used in any communications band by simply dialing-in the desired frequency on the Synthesizer.

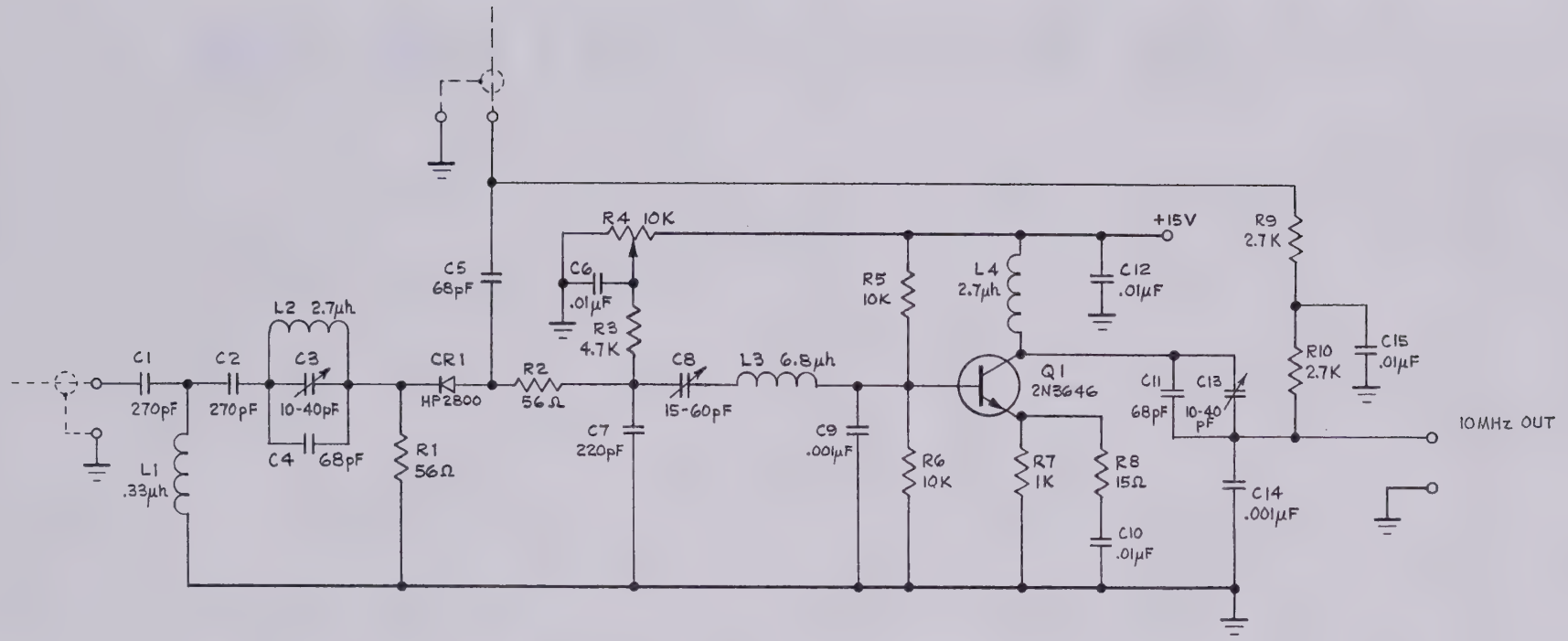
The front-panel input signal passes through a trap which reduces the 10 MHz component to avoid mixer overload. The mixer diode is a "hot carrier type" for increased sensitivity over the full input range. The output from the mixer is filtered by a circuit tuned to 10 MHz. A single transistor amplifier with a tuned output circuit provides the necessary gain.

2) CALIBRATION

The three adjustments on this plug-in are set using a variable-amplitude signal source (20 MHz to 990 MHz) and an oscilloscope capable of measuring 10 MHz. Connect the oscilloscope to the Monitor IF OUT jack. Connect the source to the INPUT on the Mixer and adjust its frequency to zero error on the 15 kHz range. Decrease the amplitude until the INPUT LEVEL lamp goes out. While watching the oscilloscope, adjust C8 and C13 for maximum amplitude. Maintain the level from the generator so that the INPUT LEVEL lamp stays out. Now, carefully adjust R4 for a maximum on the oscilloscope. Disconnect the signal generator. Select the IF MHz mode, dial-in 10.0000 MHz, and connect the Synthesizer IF OUT to the Mixer INPUT. Again, while maintaining the level below threshold, adjust C3 for a minimum oscilloscope display.



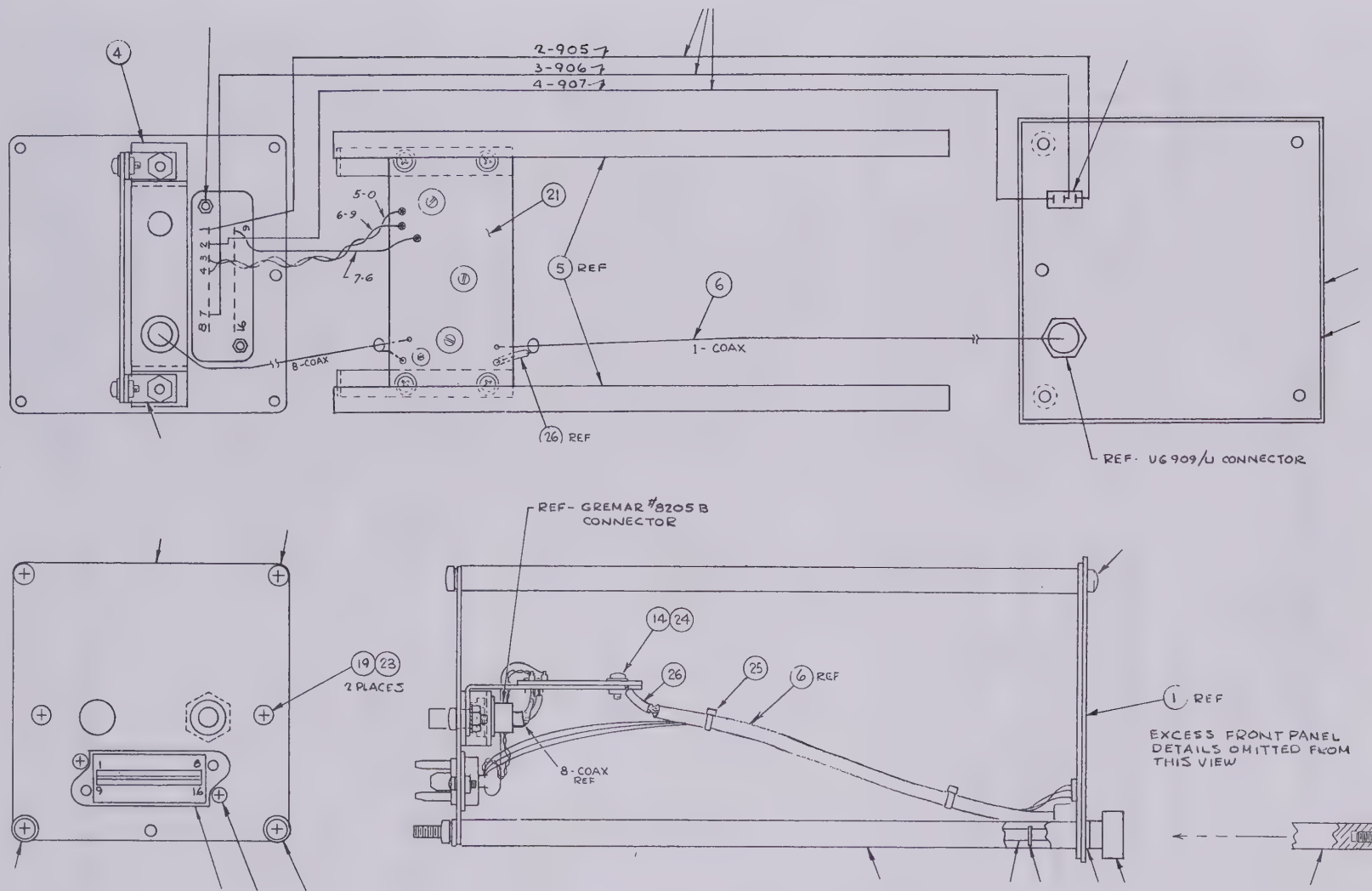
SLN-6352A, BROADBAND MIXER PLUG-IN P.C. ASSEMBLY 39974



SLN-6352A, BROADBAND MIXER PLUG-IN SCHEMATIC 39973

BROADBAND MIXER PLUG-IN PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Broadband Mixer Plug-in Assembly	39974R1
	Broadband Mixer Plug-in Schematic	39973R1
C1	Capacitor, 270 pF, DM	C0539
C2	Capacitor, 270 pF, DM	C0539
C3	Capacitor, Trim, 10-40 pF	C0709
C4	Capacitor, 68 pF, DM	C0635
C5	Capacitor, 68 pF, DM	C0635
C6	Capacitor, .01 µF, Ceramic Disc	C0556
C7	Capacitor, 220 pF, DM	C0538
C8	Capacitor, Trim, 15-60 pF	C1132
C9	Capacitor, .001 µF, Ceramic Disc	C0424
C10	Capacitor, .01 µF, Ceramic Disc	C0556
C11	Capacitor, 68 pF, DM	C0635
C12	Capacitor, .01 µF, Ceramic Disc	C0556
C13	Capacitor, Trim, 10-40 pF	C0709
C14	Capacitor, .001 µF, Ceramic Disc	C0424
C15	Capacitor, .01 µF, Ceramic Disc	C0556
CR1	Diode, HP2800	CR0363
L1	Inductor, .33 µH	L0161
L2	Inductor, 2.7 µH	L0048
L3	Inductor, 6.8 µH	L0053
L4	Inductor, 2.7 µH	L0048
Q1	Transistor, 2N3646	Q0218
R1	Resistor, 56 Ω, 1/4 W	R1554
R2	Resistor, 56 Ω, 1/4 W	R1554
R3	Resistor, 4.7 k, 1/4 W	R0892
R4	Resistor, Potentiometer, 10 k	R2383
R5	Resistor, 10 k, 1/4 W	R0766
R6	Resistor, 10 k, 1/4 W	R0766
R7	Resistor, 1 k	R0765
R8	Resistor, 15 Ω	R1607
R9	Resistor, 2.7 k	R0937
R10	Resistor, 2.7 k	R0937



SLN-6352A, BROADBAND MIXER PLUG-IN FINAL ASSEMBLY 39775

SLN-6352A FINAL ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Final Assembly	39775R3
1	Mixer P.C. Assembly	39974
2	Switch	S0149
3	Knob	H1959
4	Retaining Rod	37340
5	Connector, (Amphenol #26-159-16)	J0604
6	Bracket, RF Connector	39631

OPTIONAL PLUG-IN
DEVIATION OSCILLOSCOPE
MODEL SLN-6351A

1.1 INTRODUCTION

The Model SLN-6351A Deviation Oscilloscope Plug-in is designed to provide a visual presentation of the modulation present on a received signal. Since the display is dc-coupled, a shift in the base line indicates any frequency error. External inputs to both the vertical and horizontal channels are provided. Both inputs are one megohm impedance. The vertical input is calibrated with a basic sensitivity of 1 mV/div and a Decade Attenuator provides up to 10V/div in 5 ranges. With the exception of the display tube, this unit is fully solid state for long life and minimum maintenance. All power is provided by the S1327B mainframe. The oscilloscope will operate in either left hand plug-in space (Synthesizer or Monitor).

1.2 SPECIFICATIONS

Range: ±1.5, ±5, ±15 kHz full scale deviation;
.001, .01, .1, 1, 10 V/Div (Vertical)
(500 V dc blocking in ac mode)

Frequency Response: 50 kHz min. (3 db down).

Vertical Accuracy: ±5% to 20 kHz.

1.3 RECEIVING INSPECTION

Before accepting the instrument from the shipper, inspect the instrument's shipping container for signs of external shipping damage. Any sign of such damage must be noted by both the shipper and customer, and should be reported to the insurance investigator.

As soon as the instrument is unpacked, inspect it for shipping damage. Check for scratches or dents, broken or cracked knobs, and damaged connectors. Should any damage be found, notify your nearest Motorola representative -- do not use the instrument until instructed to do so by the representative.

1.4 INSTALLATION

Plug the oscilloscope into either the Synthesizer plug-in space or the left hand Monitor plug-in space.

1.5 OPERATION

The oscilloscope will operate whenever the main unit power is on. A few seconds will be required for the display tube filament to heat before a trace can be seen. After warmup, adjust the front panel intensity and focus and the two position controls for a horizontal line in center screen. This is best done with the scope in INTernal mode and no input to the receiver.

1.5.1 DEVIATION MEASUREMENT (INT)

With both the vertical and horizontal inputs switched to "INT", the oscilloscope will display both frequency error and any modulation present on the received signal. Accurate measurement of frequency error is best made with no modulation on the signal, however, if modulation is present, the frequency error will appear as a vertical offset in the displayed waveform. With the Synthesizer in FM mode, the scope will display both the deviation and any frequency offset.

To set the baseline to zero, first zero the receiver error meter on the 1.5 kHz range by depressing the ZERO switch and adjusting the adjacent ZERO control. While holding the ZERO switch down, adjust the scope vertical position to center the horizontal line on the screen. Release the ZERO switch. A received signal will now cause the baseline (or waveform) to shift up or down depending on the direction of the frequency error. The peak deviation may be determined directly from the display. Two tone modulation (such as is generated by a private line system and a test signal) is readily checked for peak deviation. For convenience, the two unused positions of the range switch are connected to the closest deviation range. Thus full CCW is the 1.5 kHz range and full CW is the 15 kHz range. The vernier adjustment does not have any effect.

1.5.2 EXTERNAL VERTICAL INPUT

A megohm impedance, calibrated input is provided for the vertical channel. A front panel switch selects either AC or DC coupling (as well as "INT" mode). The calibrated input has a five position decade step attenuator plus an uncalibrated vernier adjustment. To maintain calibration, the vernier (red knob in center of range switch) should be fully clockwise. Since the input is constant impedance, standard 10:1 oscilloscope probes may be used for test purposes. The frequency response is within 5% to at least 20 kHz. When the input is ac-coupled, the response is down 5 db at 300 Hz and down 3 db at 15 Hz. To improve the low frequency response when ac coupling is required, place the SLN6351A input switch in DC and use an external capacitor whose voltage rating is greater than any dc to be blocked. A .1 μF capacitor gives 5% down at 30 Hz; a 1 μF, 5% at 3 Hz. The external vertical input of the SLN6351A is usable for general oscilloscope measuring.

1.5.3 HORIZONTAL CHANNEL

The horizontal channel is normally used in the internal mode. In this case, the synchronized sweep is in operation and a stationary waveform will be displayed for most inputs. The sweep selector switch and vernier are used to control the frequency of the sweep. By adjusting these two controls, the number of cycles of the input waveform which are displayed may be varied. When the horizontal channel is used in the external mode, external signals of about 300 mV pp will give full scale deflection. This input is also 1 megohm. It may be used for any application requiring both horizontal and vertical inputs.

1.6 CALIBRATION

The following procedure is recommended for calibration of the SLN6351A Deviation Oscilloscope:

1. Plug the oscilloscope into the left plug-in space in the Monitor half of the Service Monitor.
2. Remove the Service Monitor top cover.
3. Select INT mode for both VERT and HORIZ INPUTS.
4. Set VERTICAL to 1.5 kHz (DEV), SWEEP to .3-3 kHz with vernier (red knob) centered.
5. Turn on the Service Monitor and adjust front panel FOCUS and INTENsity for a sharp trace with the Service Monitor in CW mode.
6. Position the trace at center screen vertically.
7. Adjust R44 and the H. POS control such that the trace is slightly wider than the viewing area.
8. Select AC or DC VERT INPUT.
9. Apply a known amplitude ac signal to the VERT INPUT.
10. Adjust R29 for the correct peak-to-peak display. Readjust the V. POS if necessary.
11. Put the Service Monitor in INT FM mode and reduce the deviation to zero with the black DEV ADJ knob.
12. Select INT, VERT INPUT.
13. Using the 1.5 kHz range on the Monitor ERROR meter, zero the pointer with the FM CAL control.
14. Adjust the scope V. POS for a center scale line.
15. Switch to AC or DC, VERT INPUT and adjust R10 to return the trace to center if required.
16. Switch back to INT, VERT INPUT and reset the FM CAL control for 1.5 kHz on the Monitor ERROR meter. Adjust R18 to give a reading of 1.5 kHz on the scope display. Return the line to center with the FM CAL control.

17. Calibration of the deviation measuring system requires either a signal with known deviation or a calibrated Deviation Meter SLN6350A or Deviation Scope SLN6351A.

18. If a known source is used, place the Service Monitor in RCVR mode and connect the source to the broadband input, in wide bandwidth. Peak L1 for maximum display amplitude. Then adjust R19 for proper peak-to-peak display.

19. If another calibrated plug-in is available, place the Service Monitor in INT FM mode and use the Deviation Adjust Control to give a reading of 15 kHz on the calibrated plug-in. Note that the Monitor must be in wide bandwidth. Peak L1 for maximum display amplitude. Then adjust R19 for proper peak-to-peak display.

20. If needed, R96 may be used to adjust the displayed waveform for maximum all over sharpness.

CIRCUIT DESCRIPTION
DEVIATION OSCILLOSCOPE
SCHEMATIC #39918H
SLN-6351A

The circuitry for the Oscilloscope plug-in is divided into four basic sections: 1. The Vertical Channel, 2. Horizontal Channel, 3. Sync-Sweep Circuit, and 4. Power Supply-CRT Circuit.

1. VERTICAL CHANNEL

The vertical channel has both an internal input to measure deviation on a received signal and an external input for general oscilloscope use. A common deflection amplifier is used. Transistors Q2 and Q3 are connected in a differential amplifier configuration. Diodes CR3 and CR4 prevent excessive deflection with large inputs. An internal adjustment, R29, is used to set the overall vertical gain. R35 is the front panel vertical position control. The outputs from Q2 and Q3 drive differential deflection amplifier Q4 and Q5; this amplifier uses high voltage transistors to directly drive the vertical deflection plates of the CRT.

The external vertical input may be either AC or DC coupled to the calibrated attenuator. Switch S2A and its associated resistor network (R1-R5) allow reduction of input sensitivity in steps of 10 while maintaining a constant 1 megohm input impedance. Diodes CR1 and CR2 protect the circuitry from damage due to overvoltage. Dual FET Q1 acts as a dual source follower to provide a sufficiently high impedance to avoid loading effects on the attenuator. R10 permits balancing out any offset created by the source followers. Integrated circuit U1 is an operational amplifier whose gain may be adjusted by R92. The amplifier is non-inverting and operates with a gain of 10 when in the "CAL" position of R92, the front panel vertical gain control. When R92 is fully CCW, the amplifier operates at unity gain.

The internal vertical system is used to display frequency error and deviation as measured by the monitor mainframe. Integrated circuit U4 is an FM discriminator and is used to measure the amount of deviation on the received signal. Inductor L1 and capacitor C16 provide the required phase shift for the quadrature detector. The output of U4 is buffered by Q6 and provides one of two inputs to summing amplifier U2.

Summing amplifier U2 combines the output from deviation detector U4 with the error voltage from the Monitor. In effect, the error voltage provides the dc portion of the signal and the deviation detector provides the ac portion. R18 and R19 are used to adjust the two signals to the proper relationship. A second pole of the input attenuator switch is used to select one of the three deviation measuring ranges when in the internal mode. Amplifier U3 is used to both invert the signal from U2 and to filter out any residual 200 kHz which is present. L2 and C44 in the feedback path reduce the amplifier gain at

their series resonant frequency (200 kHz) and thereby reduce any signal at 200 kHz.

2. HORIZONTAL CHANNEL

The horizontal channel consists of a differential amplifier (Q15 and Q16) with high input impedance provided by dual source followers Q14. The horizontal input is 1 megohm and is ac-coupled. Diodes CR5 and CR6 provide overload protection. R76 is the front panel horizontal position control. A high voltage differential amplifier (Q17 and Q18) provides drive to the deflection plates.

3. SYNC-SWEEP CIRCUIT

The sync-sweep circuit provides a sweep voltage to the horizontal amplifier which is synchronized to the displayed waveform. A portion of the vertical signal from the emitter of Q4 is used to drive Schmitt trigger Q11 and Q12. This circuit will produce a negative going pulse at the collector of Q12 each time the vertical signal crosses the trigger level in a negative direction. The sync circuit is very sensitive and will operate on a signal which is only 1/4 of 1 division in amplitude.

The negative going pulses from the Schmitt trigger are used to synchronize the end of the sweep ramp. Transistor Q13 normally biases the B2 of unijunction Q9 at 12V. When a sync pulse occurs this voltage drops slightly. If the emitter voltage of the unijunction is close to the firing point, the slight reduction in B2 voltage will initiate the firing slightly early. Since the retrace time is fixed for each range, the start of the sweep becomes synchronized with the vertical display. Transistor Q8 is a constant current source which charges the switch selected sweep timing capacitors. Front panel control R47 is a vernier for the sweep speed and operates by varying the charging current. Retrace occurs when the sweep voltage reaches the firing point of Q9. The sweep is recurring without any input signal on the vertical channel.

Retrace blanking is provided via high voltage transistor Q10. The B1 voltage from Q9 rises during retrace causing Q10 to turn on. This in turn creates a large negative going pulse which, when coupled to the control grid of the CRT, turns the beam off during retrace.

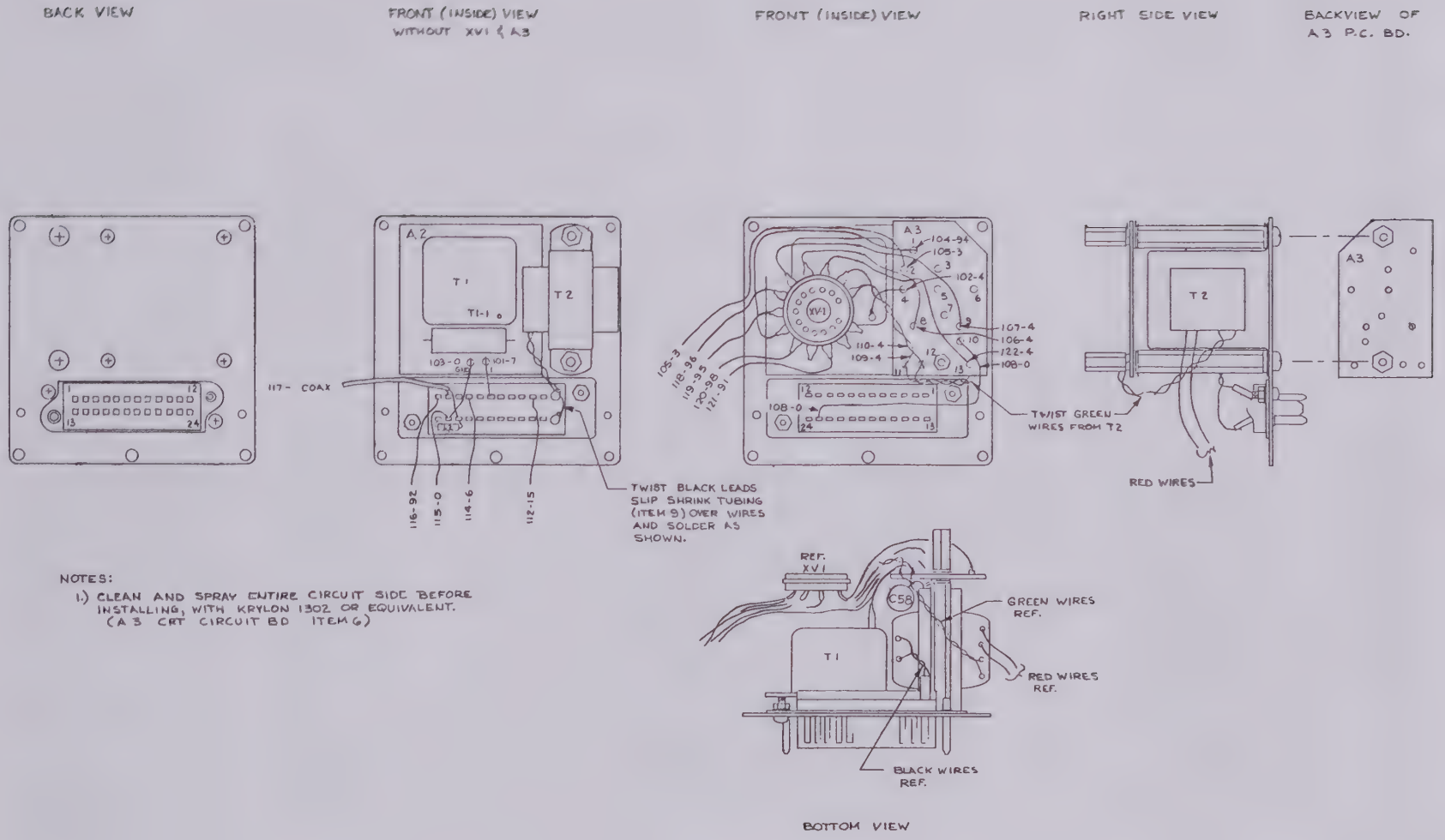
4. POWER SUPPLY-CRT CIRCUIT

Various controls are provided for the CRT. R84 and R87 are front panel mounted and adjust intensity and focus, respectively. R96 is an internal adjustment for astigmatism correction.

Two power supply voltages are generated within the oscilloscope plug-in. Transformer T2 supplies 6.3 V for the CRT filament and, via rectifiers CR8-CR11 and filter R104 and C40, 140 V for the deflection amplifiers. The -1300 V anode supply is provided from a high voltage inverter.

SLN-6351A FRONT PANEL ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Scope Deviation Plug-In Front Panel Assembly	45001C
1	Knob, Black	H1189
2	Knob, Concentric, Red	H1297
3	Knob, Concentric Base	H1979
CR1	Capacitor, .01 μF, 500 V, Disc	C0423
J1	Not Used	
J2	Connector, BNC (Long Bushing)	J0260
J3	Connector, BNC (Long Bushing)	J0260
R6	Resistor, 10 k, 1/4 W 5%, CC	R0766
R35	Potentiometer, 1 turn, 10 k	R1860
R47	Sweep Range Switch Assembly	45056
R76	Potentiometer, 1 turn, 10 k	R1860
R84	Potentiometer, H.V., 1 turn, 1 Meg	R2790
R87	Potentiometer, H.V., 1 turn, 1 Meg	R2790
R92	Attenuator Switch Assembly	45055
R93	Resistor, 10 k, 1/4 W, 5%, CC	R0766
S1	Switch, Toggle Min, 2P3T	S0410
S2	Switch, Attenuator Assembly	45055
S3	Switch, Toggle Min, 2P2T	S0150
S4	Switch, Sweep Range Assembly	45056



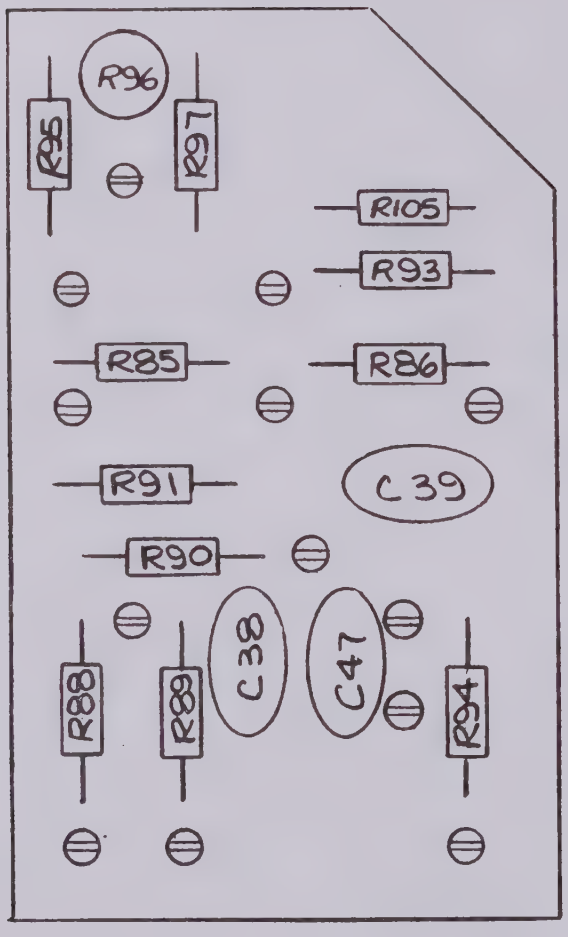
NOTES:

1.) CLEAN AND SPRAY ENTIRE CIRCUIT SIDE BEFORE INSTALLING, WITH KRYLON 1302 OR EQUIVALENT. (A3 CRT CIRCUIT BD ITEM 6)

SLN-6351A, REAR PANEL SUBASSEMBLY 45081

SLN-6351A REAR PANEL SUBASSEMBLY PARTS LIST

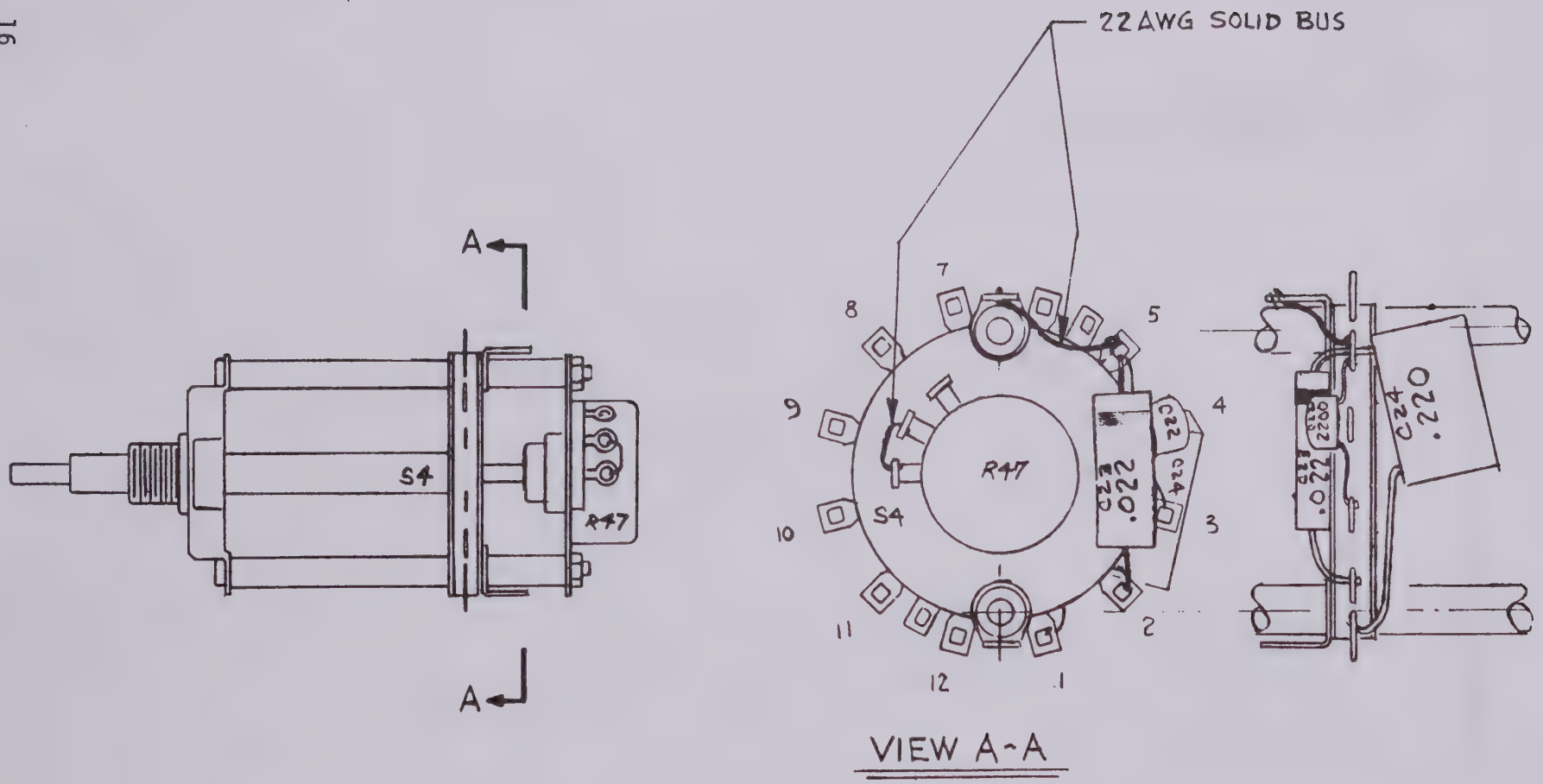
REF.	DESCRIPTION	SD PART NO.
	Rear Panel	39890B
	Rear Panel Subassembly	45081B
A1	Not Used	
A2	H.V. Inverter P.C. Bd. Assembly	04584201
A3	CRT Circuit Bd P.C. Assembly	45002
C58	Capacitor, .01 µF 1600 V	C1287
J1	Connector, 24 Pin	09061450
L3	Inductor, 10 µH	L0153
T1	Not Used	
T2	Transformer	T0115



A3 CRT CIRCUIT ASSEMBLY 45002

SLN-6351A, ATTENUATOR SWITCH ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Attenuator Switch Assembly	45055A
R1	Resistor, 909 k, MF, 1%	R2789
R2	Resistor, 90.9 k, MF, 1%	R2788
R3	Resistor, 9.09 k, MF, 1%	R2787
R4	Resistor, 909 Ω, MF, 1 %	R2648
R5	Resistor, 100 Ω, MF, 1%	R2651
R92	Resistor, 50 k, Potentiometer (Part of S2)	39981
S2	Switch, Sweep Range	39981



VIEW A-A

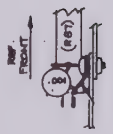
NOTE:

1. MOUNT ITEMS 2, 3 & 4 CLOSE TO TERMINALS.
2. TEFLON SLEEVE CAP. LEADS WHERE REQUIRED. SLEEVING ON LEADS TO COMMON TERMINAL (5), NOT REQUIRED.

SLN-6351A, SWEEP RANGE SWITCH ASSEMBLY 45056

SLN-6351A, SWEEP RANGE SWITCH ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Sweep Range Switch Assembly	45056A
C22	Capacitor, .0022 µF	03290790
C23	Capacitor, .022 µF	03278930
C24	Capacitor, .22 µF	03290240
R47	Resistor, 50 k, Potentiometer (Part of S4)	39982
S4	Switch, Sweep Range	39982



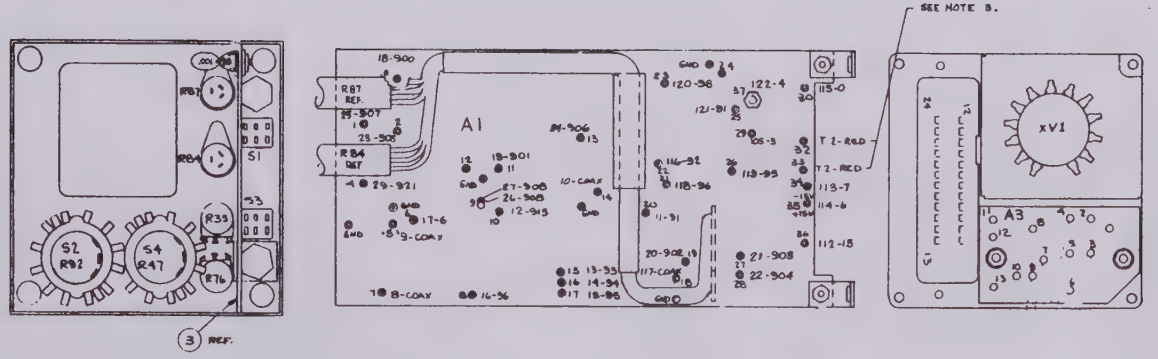
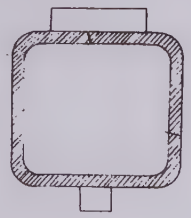


FIG. 1



NOTES:
1. BEND ITEM 7 TO 7/8 RADIUS AS SHOWN AND PLACE A 3½" STRIP OF ITEM 8 INSIDE OF ITEM 7 AS SHOWN. PLACE A 1½ STRIP OF ITEM 8 ON ITEM 6 AS SHOWN
2) WIRES ROUTED & SOLDERED ON BOTTOM SIDE OF P.C Bd.
2) WIRES FROM REAR PANEL ASSY., 100 SERIES No's
3) TWIST RED WIRES FROM T2 TOGETHER AND SOLDER TO TERMINALS 32 & 33
4) CLEAN AND SPRAY COMPONENT SIDE WITH KRYLON 1302 OR EQUIVALENT OVER ENTIRE SURFACE.

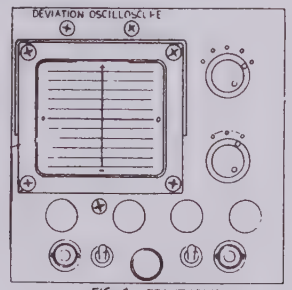


FIG. 4 FRONT VIEW

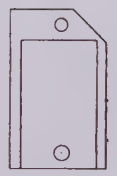
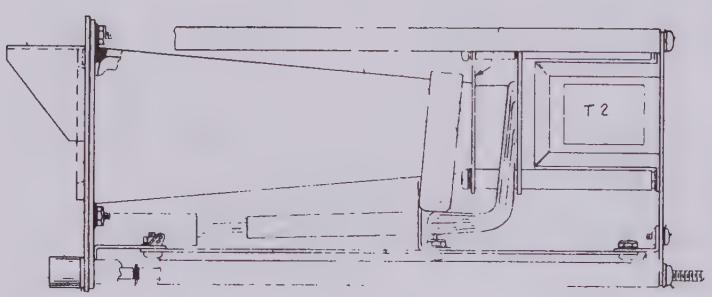


FIG. 5

SOLVENT ACTIVATED ADHESIVE



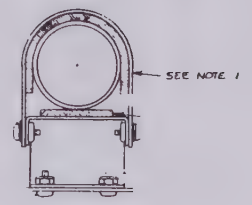


FIG. 2

SLN-6351A, FINAL ASSEMBLY 45003

SLN-6351A, FINAL ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Scope Deviation Plug-In Assembly	45003C
1	Hood	39881
2	Bezel	39878
3	Graticule	39880
4	Shield Board	45101
5	Knob	H1959
6	Rear Panel Sub Assembly	045081
7	Front Panel Sub Assembly	45001
A1	Scope P.C. Bd.	39921
C57	Capacitor, .001 µF, Disc, 3 kV	C1274
V1	CRT	V0134

A1 DEVIATION OSCILLOSCOPE P.C. ASSEMBLY 39921

OSCILLOSCOPE P.C. BOARD PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Scope P.C. Board Assembly	39921H
	Scope P.C. Board Schematic	39918H
C1	Not Used	
C2	Capacitor, 56 pF, DM	C0534
C3	Capacitor, 32 µF, Electro	03290200
C4	Not Used	
C5	Capacitor, 33 pF, DM	C0531
C6	Capacitor, .01 µF, 50 V, Disc	C0562
C7	Capacitor, .01 µF, 50 V, Disc	C0562
C8	Capacitor, 22 pF, DM	C0531
C9	Capacitor, .01 µF, 50 V, Disc	C0562
C10	Capacitor, .01 µF, 50 V, Disc	C0562
C11	Capacitor, 22 pF, DM	C0531
C12	Capacitor, 1 µF, Monol. Cer.	C0879
C13	Capacitor, .001 µF, 500 V, Monol.	C0424
C14	Capacitor, 100 µF, Electro.	C0832
C15	Capacitor, .1 µF, 10 V, Disc	C0661
C16	Capacitor, 100 pF, DM	C0874
C17	Capacitor, 1 µF, Tant	C0524
C18	Not Used	
C19	Capacitor, .01 µF, 500 V, Disc	C0423
C20	Capacitor, .01 µF, 500 V, Disc	C0423
C21	Capacitor, .01 µF, 50 V, Disc	C0562
C22	Not Used	
C23	Not Used	
C24	Not Used	
C25	Capacitor, .01 µF, 500 V, Disc	C0423
C26	Capacitor, .001 µF, 3 kV	C1274
C27	Not Used	
C28	Capacitor, 1 µF, 35 V, Tant	03290290
C29	Capacitor, 22 µF, 15 V, Electro.	C0693
C30	Capacitor, .01 µF, 50 V, Disc	C0562
C31	Capacitor, .001 µF, 500 V, Monol.	C0424
C32	Capacitor, .01 µF, 50 V, Disc	C0562
C33	Capacitor, .001 µF, 590 V, Monol.	C0424
C34	Capacitor, .047 µF, 250 V	03281080
C35	Capacitor, .01 µF, 50 V, Disc	C0562
C36	Capacitor, .01 µF, 50 V, Disc	C0562

OSCILLOSCOPE P.C. BOARD PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
C37	Not Used	
C38	Not Used	
C39	Not Used	
C40	Capacitor, 20 µF, 250 V, Electro.	03278700
C41	Capacitor, .1 µF, Monol. Cer.	C0881
C42	Capacitor, .05 µF, 12 V, Disc	C0672
C43	Capacitor, 680 pF, DM	C0638
C44	Capacitor, 680 pF, DM	C0638
C45	Capacitor, .047 µF, 250 V	03281080
C46	Capacitor, 47 pF, DM	C0533
C47	Not Used	
C48	Not Used	
C49	Not Used	
C100	Capacitor, 330 pF, DM	C0540
C101	Capacitor, .01 µF, 50 V, Disc	C0562
C102	Capacitor, 5 pF, DM	C1071
CR1	Diode, FD300	26012320
CR2	Diode, FD300	26012320
CR3	Diode, 1N4151	CR0150
CR4	Diode, 1N4151	CR0150
CR5	Diode, FD300	26012320
CR6	Diode, FD300	26012320
CR7	Diode, 1N4151	CR0150
CR8	Diode, 1N4005	CR0284
CR9	Diode, 1N4005	CR0284
CR10	Diode, 1N4005	CR0284
CR11	Diode, 1N4005	CR0284
CR12	Not Used	
CR13	Not Used	
CR14	Not Used	
CR15	Not Used	
CR16	Not Used	
CR17	Not Used	
CR18	Diode, 1N4151	CR0150
L1	Inductor, 3-3.5 µH, 20 T	39666-1
	Inductor, Coil Form	E0304
L2	Inductor, 100 µH	L0068

OSCILLOSCOPE P.C. BOARD PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
Q1	Transistor, 2N3958, Dual FET	26015100
Q2	Transistor, 2N3565, NPN	26012000
Q3	Transistor, 2N3565, NPN	26012000
Q4	Transistor, 15840, NPN	15840
Q5	Transistor, 15840, NPN	15840
Q6	Transistor, 2N4091, FET	Q0304
Q7	Transistor, 2N5459, FET	Q0264
Q8	Transistor, 2N3906, PNP	Q0248
Q9	Transistor, 2N4870, Unij.	Q0266
Q10	Transistor, 15840, NPN	15840
Q11	Transistor, 2N3565, NPN	26012000
Q12	Transistor, 2N3565, NPN	26012000
Q13	Transistor, 2N3565, NPN	26012000
Q14	Transistor, 2N3958, Dual FET	26015100
Q15	Transistor, 2N3565, NPN	26012000
Q16	Transistor, 2N3565, NPN	26012000
Q17	Transistor, 15840, NPN	15840
Q18	Transistor, 15840, NPN	15840
R1	Not Used	
R2	Not Used	
R3	Not Used	
R4	Not Used	
R5	Not Used	
R6	Not Used	
R7	Resistor, 10 k	R0766
R8	Resistor, 1 k	R0765
R9	Resistor, 33 k	R0780
R10	Resistor, 5 k, Potentiometer	R2697
R11	Resistor, 33 k	R2638
R12	Not Used	
R13	Resistor, 100 k, 1%	R2638
R14	Resistor, 4.99 k, 1%	R2636
R15	Resistor, 15 k, 1%	R2073
R16	Resistor, 49.9 k, 1%	R2642
R17	Resistor, 1.8 k	R0959
R18	Resistor, 100 k, Potentiometer	R2792
R19	Resistor, 20 k, Potentiometer	R2791
R20	Resistor, 10 k	R0764

OSCILLOSCOPE P.C. BOARD PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R21	Resistor, 470 Ω	R1044
R22	Resistor, 10 k	R0765
R23	Resistor, 56 Ω	R1554
R24	Resistor, 180 Ω	R1233
R25	Resistor, 3.9 k	R0939
R26	Resistor, 1.8 k	R0959
R27	Resistor, 2.2 k	R0749
R28	Resistor, 220 Ω	R0760
R29	Resistor, 500 Ω, Potentiometer	R2793
R30	Resistor, 2.2 k	R0749
R31	Resistor, 220 Ω	R0760
R32	Resistor, 2.2 k	R0749
R33	Resistor, 15 k	R0728
R34	Resistor, 150 Ω	R0983
R35	Not Used	
R36	Resistor, 15 k	R0728
R37	Resistor, 150 Ω	R0983
R38	Resistor, 22 k, 1 W	R2341
R39	Resistor, 22 k, 1 W	R2341
R40	Resistor, 330 Ω	R0662
R41	Resistor, 330 Ω	R0662
R42	Resistor, 3.9 k	R0939
R43	Resistor, 4.7 k	R0892
R44	Resistor, 2 k, Potentiometer	R2794
R45	Resistor, 2.2 k	R0749
R46	Resistor, 12 k	R0759
R47	Not Used	
R48	Resistor, 4.7 k	R0892
R49	Resistor, 82 Ω	R1059
R50	Resistor, 220 Ω	R0760
R51	Resistor, 47 k	R0777
R52	Resistor, 15 k	R0728
R53	Resistor, 470 Ω	R1044
R54	Resistor, 150 k	R0961
R55	Resistor, 10 k	R0766
R56	Resistor, 1.8 k	R0959
R57	Resistor, 22 Ω	R1436
R58	Resistor, 3.9 k	R0939
R59	Resistor, 1 k	R0765
R60	Resistor, 3.9 k	R0939

OSCILLOSCOPE P.C. BOARD PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R61	Resistor, 1.8 k	R0959
R62	Resistor, 10 k	R0766
R63	Resistor, 22 k	R0768
R64	Resistor, 3.9 k	R0939
R65	Resistor, 3.9 k	R0939
R66	Resistor, 1 M	R0962
R67	Resistor, 33 k	R0780
R68	Resistor, 2.2 k	R0749
R69	Resistor, 2.2 k	R0749
R70	Resistor, 56 Ω	R1554
R71	Resistor, 56 Ω	R1554
R72	Resistor, 2.2 k	R0749
R73	Resistor, 33 k	R0780
R74	Not Used	
R75	Resistor, 15 k	R0728
R76	Not Used	
R77	Resistor, 15 k	R0728
R78	Not Used	
R79	Resistor, 22 k, 1 W	R2341
R80	Resistor, 22 k, 1 W	R2341
R81	Resistor, 330 Ω	R0662
R82	Resistor, 330 Ω	R0662
R83	Resistor, 3.9 k	R0939
R84	Resistor, 330 Ω, 1/8 W, 5%	R1444
R104	Resistor, 1 k, 1 W	R1089
R105	Not Used	
R106	Resistor, 22 k	R0768
R107	Resistor, 47 k	R0777
R108	Resistor, 47 k	R0777
R109	Resistor, 1.8 k	R0959
U1	Integrated Circuit, LM301A	25745
U2	Integrated Circuit, LM301A	25745
U3	Integrated Circuit, LM301A	25745
U4	Integrated Circuit, MC1357P	45216

OPTIONAL PLUG-IN
PRESELECTORS
MODELS SLN-6353A & SLN-6354A
SLN-6369A & SLN-6355A

1.1 INTRODUCTION

There are four standard Preselector Plug-ins providing additional sensitivity and selectivity in the 25-50, 145-175, 406-420, and 450-512 MHz bands when used with the S1327B Service Monitor. Each plug-in preselector also features a broadband input, permitting the Service Monitor to be used on any frequency from 20 to 990 MHz without the need for a separate broadband mixer plug-in. Sensitivity of better than 20 mV for full quieting of the receiver is maintained across each band with a single, easy to read frequency tracking tuning dial. In the wideband mode (MIXER INPUT) sensitivity is better than 10 mV up to 590 MHz and 20 mV to 990 MHz.

1.2 OPERATION

Two switches, one tuning dial and a meter, are located on the front panel and provide control and monitoring for preselector operation.

With the center switch in PRESELECTOR mode, the input should be connected to the PRESELECTOR INPUT connector. The frequency which you wish to receive is then dialed into the thumbwheel switches of the Service Monitor (in RCVR mode). The tuning dial of the preselector is now set to approximately the frequency to be received. Note that the tuning dial actually only "peaks" the receiver and does not control its frequency. This frequency control is provided by the "drift free" signal generated by the Service Monitor. The tuning meter is an aid to proper peaking of the tuning dial and is so designed that the reading is greatly compressed at the high end of the scale, so even strong signals will read on scale. Having no relative calibration, the meter should not be used as a signal strength monitor - it is only intended to aid tuning.

Both WIDE and NARROW IF bandwidths are available by means of the remaining front panel switch. It is recommended that the NARROW position be used routinely to reduce noise and adjacent channel interference. Note, however, that for signals with large deviation or high modulating frequencies, the bandwidth in NARROW may not be sufficient to pass the modulation without distortion.

When in MIXER mode the right input is used and any frequency from 20 to 990 MHz may be received, as with the Broadband Mixer plug-in. The WIDE-NARROW selector and tuning meter function as in the PRESELECTOR mode.

1.3 SPECIFICATIONS

The plug-ins cover the following ranges:

SLN-6353A	25-50 MHz and broadband
SLN-6354A	145-175 MHz and broadband
SLN-6369A	406-420 MHz and broadband
SLN-6355A	450-512 MHz and broadband

CIRCUIT DESCRIPTION
PRESELECTOR PLUG-INS
MODELS SLN-6353A & SLN-6354A

1) CIRCUIT DESCRIPTION

The preselector contains all the circuitry required to amplify the received signal, to convert this signal to the 10 MHz IF, to amplify the IF, and to detect the proper level which activates the squelch. All tuning of the RF amplifier stage and the local oscillator amplifier stage is done by voltage-variable capacitors. Diode switches are used to switch modes and IF bandwidths. A separate hot carrier diode mixer is used for the broadband mixer portion.

The input signal is coupled to a tuned circuit composed of L1, C2, and CR1. A dual, insulated gate, MOS field-effect transistor, Q1, is used for the RF amplifier to reduce cross modulation effects. The output of this amplifier is tuned by L3, C11, and CR2 and fed to one input of another FET, Q2. The local oscillator signal is amplified by grounded base amplifier Q3, tuned with L4, C20 and CR3, and fed to the other input of mixer Q2. Again, the use of the dual gate FET for the mixer reduces cross modulation and other spurious products. Coil L3 and capacitor C9 provide a resonant circuit at the 10 MHz IF output of the mixer.

Signals applied to the broadband MIXER input of the plug-in are first filtered by network L7, C53, and C54 to remove any 10 MHz component. The signal is then mixed with the local oscillator in diode CR14, and fed through a series-tuned 10 MHz filter which rejects any component not at the desired 10 MHz IF.

Diode switches CR4 and CR5 are used to select either the PRESELECTOR signal or the MIXER signal and feed it through emitter follower Q4 into the IF bandwidth switching network, which is composed of crystal filter Y1 and a diode switch bypass. When the NARROW mode is selected, diodes CR6 and CR9 are turned on, diodes CR7 and CR8 are turned off, and the signal is routed through the crystal filter. In the WIDE mode, the diode switch positions are reversed and the signal bypasses the filter. Emitter follower Q5 provides a low impedance source to drive amplifier U1.

The 10 MHz signal from the bandwidth switching network is further amplified by a high gain, AGC type amplifier. Integrated circuit U1, tuned on both input and output, provides the gain; and transistor Q6 acts as an adjustable threshold AGC amplifier. By adjusting R69 the point at which AGC action begins may be set.

The output of Q6 is also used to drive the "level detect" circuit. A voltage doubler, composed of two hot-carrier type diodes (CR15 and 16) peak detects the 10 MHz signal and supplies a dc voltage to amplifier U2. This amplifier has a gain of three and additionally provides the required low output impedance to drive the tuning meter and Schmitt

trigger Q8, Q9. The "trip point" of the Schmitt trigger is adjustable with R60,and is set such that the monitor will turn on at a point where the signal is strong enough for proper quieting. Transistor Q10 provides the required voltage level to operate the output diode switch and allows a 10 MHz signal to be supplied to the Monitor Mainframe.

2) MAINTENANCE & CALIBRATION (SLN-6354A & SLN-6353A)

No routine maintenance other than periodic dusting of the plug-in with a soft brush is required. To recalibrate the plug-in, a variable amplitude signal generator will be required. The following adjustment procedure assumes that the unit is not totally misadjusted, i.e. it is possible to turn on the Monitor with a sufficiently strong signal.

a) Dial and tune a frequency which is 1.1 MHz above the lower band edge and set the signal generator to give a zero frequency reading on the error meter (15 kHz range). If possible, the tuning meter should be about half scale.

b) Using a nonmetallic tuning tool with a 3/32" wide blade, adjust L9 & L10 for a maximum tuning meter reading, reducing the generator amplitude as needed to keep the needle about half scale.

c) Carefully adjust L1, L3, and L4 for a maximum tuning meter reading, again reducing the generator amplitude, as required.

d) Dial and tune in a frequency which is 1 MHz below the upper band edge and set the signal generator to give a zero error reading on the error meter (15 kHz range). The tuning meter should be about half scale.

e) Adjust C2, C11, and C20 for a maximum reading on the tuning meter, reducing the generator amplitude as needed.

f) Repeat steps a) through e) (omitting step b) until no significant improvement in sensitivity is obtainable. This series of adjustments has aligned the RF and LO amplifier tracking.

g) Using whatever frequency is presently set up, increase the signal generator amplitude and adjust R69 such that the tuning meter does not go off scale at the high end with a signal of 10 mV.

h) Reduce the signal amplitude; and, with the preselector in WIDE, adjust R60 such that the Monitor comes on with about 1 kHz of deviation present (noise). The signal generator output level should now be below 20 μV (typically it will be 10 μV). Note that the use of NARROW reduces the noise significantly.

i) Connect the signal generator to the MIXER input, select MIXER mode, and increase the amplitude until the tuning meter reads

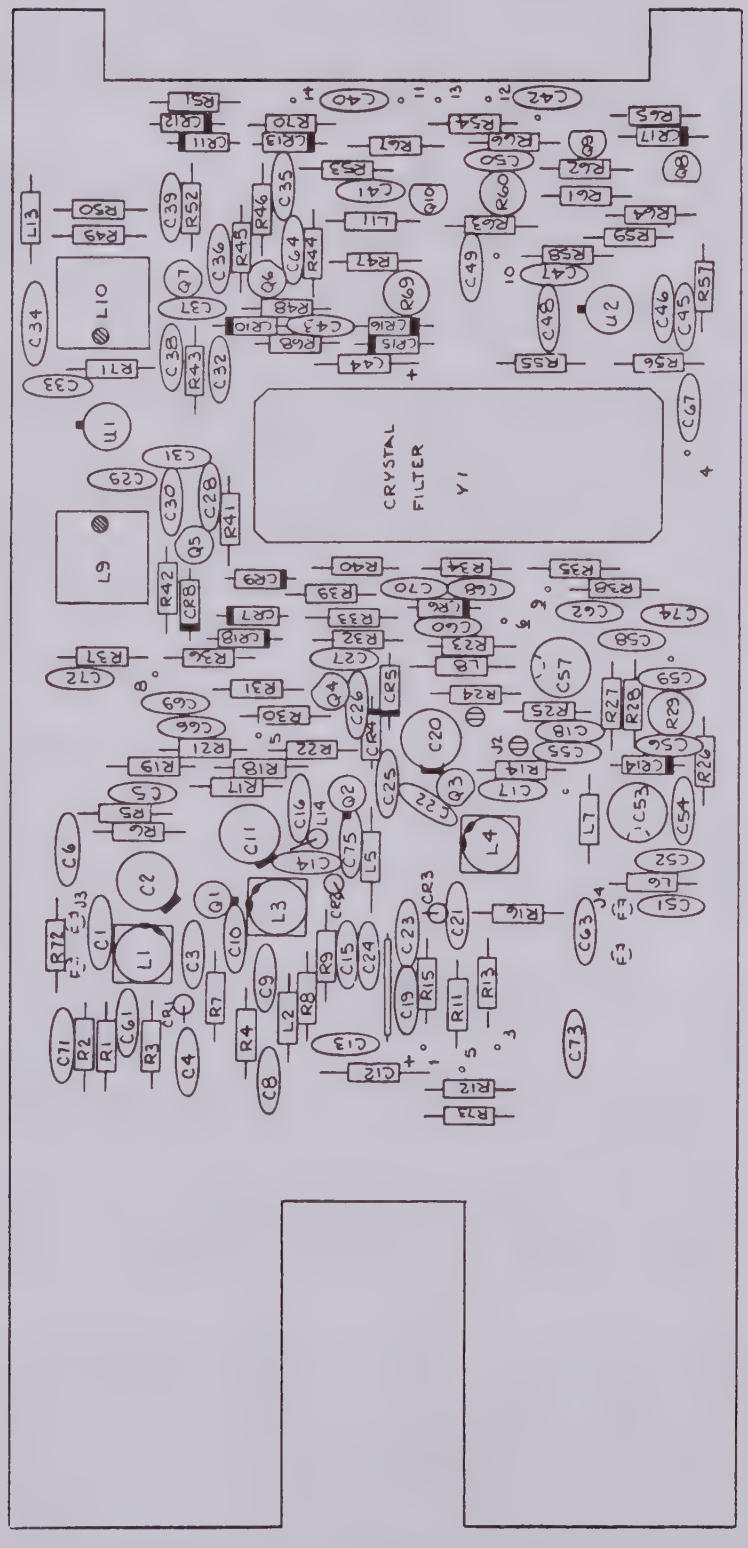
about half scale with a zero frequency error reading (15 kHz range).

j) Adjust C57 and R29 for a maximum tuning meter reading, reducing the generator amplitude as required.

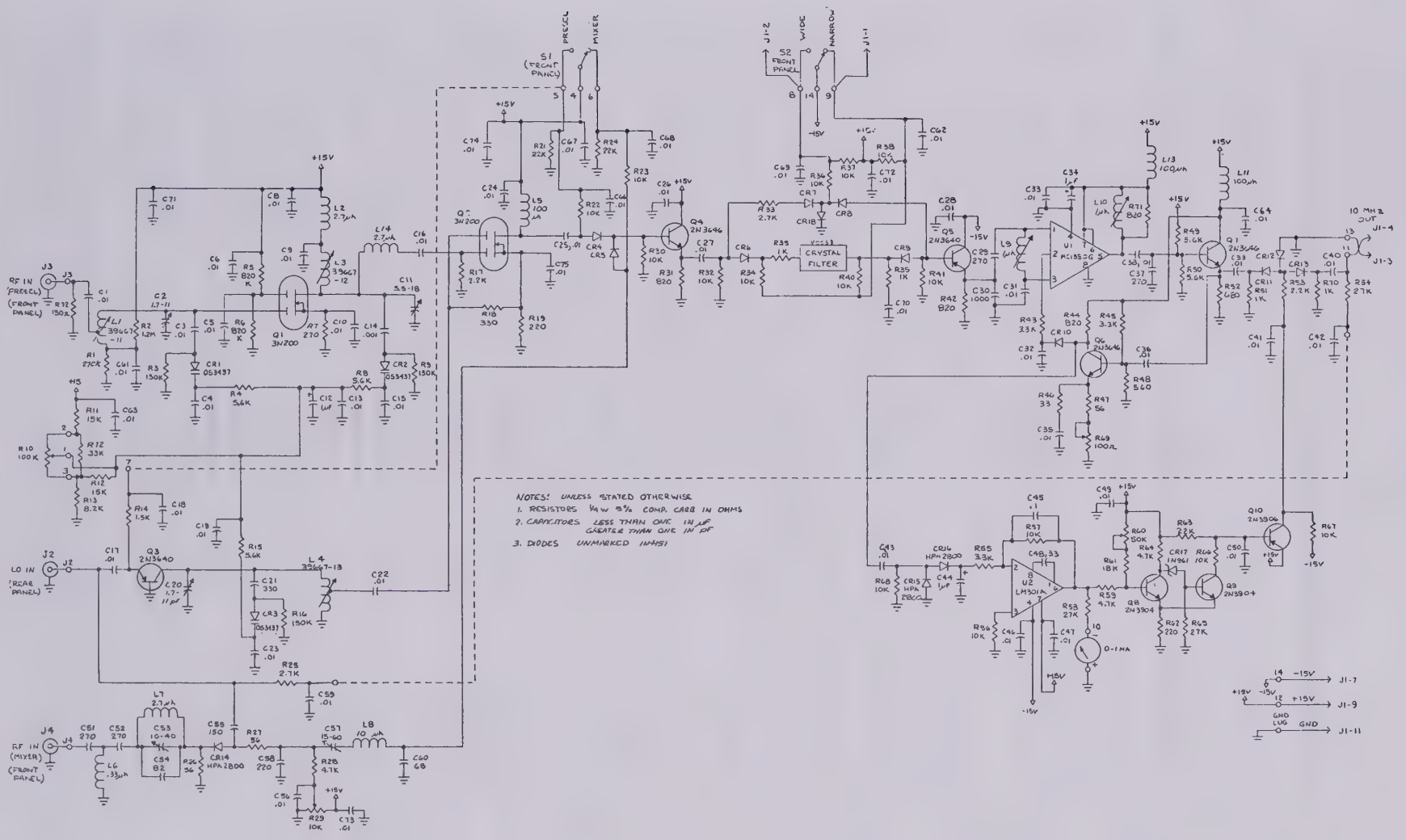
k) Connect the Synthesizer IF OUT to the MIXER input, select IF MODE and dial in 10 MHz. Adjust the IF level control for a half scale reading on the tuning meter.

l) Adjust C53 for a minimum reading on the tuning meter. This adjusts the 10 MHz trap.

In the event that the preselector is so out of adjustment that the Monitor cannot be turned on, a high sensitivity 10 MHz oscilloscope will have to be used for initial tune up. Follow step k) above, except increase the signal until an output is obtained on the emitter of Q5 (peak C57). Next, monitor the emitter of Q7 and adjust L9 and L10 for maximum. Always reduce the input signal amplitude to the lowest value which can be used. Now align the preselector according to the above procedure (steps a through l).



SLN-6353A, PRESELECTOR P.C. ASSEMBLY 45339



SLN-6353A, PRESELECTOR SCHEMATIC 45336

SLN-6353A PRESELECTOR P.C. ASSEMBLY PARTS LIST

REF.	DESCRIPTION	SD PART NO.
	Preselector P.C. Assembly	45339F
	Preselector P.C. Schematic	45336E
C1	Capacitor, .001 µF, Ceramic, 75 V	C1155
C2	Capacitor, Trimmer 1.7-11 pF	C1255
C3	Capacitor, .001 µF, Ceramic Disc	C0424
C4	Capacitor, .001 µF, Ceramic, 75 V	C1155
C5	Capacitor, .001 µF, Ceramic, 75 V	C1155
C6	Capacitor, .001 µF, Ceramic, 75 V	C1155
C7	Not Used	
C8	Capacitor, .001 µF, Ceramic, 75 V	C1155
C9	Capacitor, .001 µF, Ceramic, 75 V	C1155
C10	Capacitor, .001 µF, Ceramic, 75 V	C1155
C11	Capacitor, Trimmer 5.5-18 pF	C0712
C12	Capacitor, 1 µF Tant, Electro	03290290
C13	Capacitor, .001 µF, Ceramic, 75 V	C1155
C14	Capacitor, .001 µF, Ceramic, Disc	C0424
C15	Capacitor, .001 µF, Ceramic, 75 V	C1155
C16	Capacitor, .001 µF, Ceramic Disc	C0424
C17	Capacitor, .001 µF, Ceramic Disc	C0424
C18	Capacitor, .001 µF, Ceramic, 75 V	C1155
C19	Capacitor, .001 µF, Ceramic, 75 V	C1155
C20	Capacitor, Trimmer 1.7-11 pF	C1255
C21	Capacitor, 300 pF, DM	C0540
C22	Capacitor, .001 µF, Ceramic, 75 V	C1155
C23	Capacitor, .001 µF, Ceramic, 75 V	C1155
C24	Capacitor, .001 µF, Ceramic, 75 V	C1155
C25	Capacitor, .001 µF, Ceramic, 75 V	C1155
C26	Capacitor, .001 µF, Ceramic, 75 V	C1155
C27	Capacitor, .001 µF, Ceramic, 75 V	C1155
C28	Capacitor, .001 µF, Ceramic, 75 V	C1155
C29	Capacitor, 270 pF, DM	C1139
C30	Capacitor, 1000 pF, DM	C1144
C31	Capacitor, .001 µF, Ceramic, 75 V	C1155
C32	Capacitor, .001 µF, Ceramic, 75 V	C1155
C33	Capacitor, .001 µF, Ceramic, 75 V	C1155
C34	Capacitor, 1 µF, Monol Ceramic	C0879
C35	Capacitor, .001 µF, Ceramic, 75 V	C1155
C36	Capacitor, .001 µF, Ceramic, 75 V	C1155
C37	Capacitor, 270 µF, DM	C1139
C38	Capacitor, .001 µF, Ceramic, 75 V	C1155

SLN-6353A PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
C39	Capacitor, .001 µF, Ceramic, 75 V	C1155
C40	Capacitor, .001 µF, Ceramic, 75 V	C1155
C41	Capacitor, .001 µF, Ceramic, 75 V	C1155
C42	Capacitor, .001 µF, Ceramic, 75 V	C1155
C43	Capacitor, .001 µF, Ceramic, 75 V	C1155
C44	Capacitor, 1 µF Tant. Electro	03290290
C45	Capacitor, .1 µF, Monol Ceramic	C0881
C46	Capacitor, .001 µF, Ceramic, 75 V	C1155
C47	Capacitor, .001 µF, Ceramic, 75 V	C1155
C48	Capacitor, 33 pF, DM	C0877
C49	Capacitor, .001 µF, Ceramic, 75 V	C1155
C50	Capacitor, .001 µF, Ceramic, 75 V	C1155
C51	Capacitor, 270 pF, DM	C1139
C52	Capacitor, 270 pF, DM	C1139
C53	Capacitor, Trimmer 10-40 pF	C0709
C54	Capacitor, 82 pF, DM	C0873
C55	Capacitor, 150 pF, DM	C1076
C56	Capacitor, .001 µF, Ceramic, 75 V	C1155
C57	Capacitor, Trimmer 15-60 pF	C1132
C58	Capacitor, 220 pF, DM	C1077
C59	Capacitor, .001 µF, Ceramic, 75 V	C1155
C60	Capacitor, 68 pF, DM	C0635
C61	Capacitor, .001 µF, Ceramic, 75 V	C1155
C62	Capacitor, .001 µF, Ceramic, 75 V	C1155
C63	Capacitor, .001 µF, Ceramic, 75 V	C1155
C64	Capacitor, .001 µF, Ceramic, 75 V	C1155
C65	Not Used	
C66	Capacitor, .001 µF, Ceramic, 75 V	C1155
C67	Capacitor, .001 µF, Ceramic, 75 V	C1155
C68	Capacitor, .001 µF, Ceramic, 75 V	C1155
C69	Capacitor, .001 µF, Ceramic, 75 V	C1155
C70	Capacitor, .001 µF, Ceramic, 75 V	C1155
C71	Capacitor, .001 µF, Ceramic, 75 V	C1155
C72	Capacitor, .001 µF, Ceramic, 75 V	C1155
C73	Capacitor, .001 µF, Ceramic, 75 V	C1155
C74	Capacitor, .001 µF, Ceramic, 75 V	C1155
C75	Capacitor, .001 µF, Ceramic, 75 V	C1155
CR1	Diode, Selected	053437
CR2	Diode, Selected	053437
CR3	Diode, Selected	053437

SLN-6353A PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

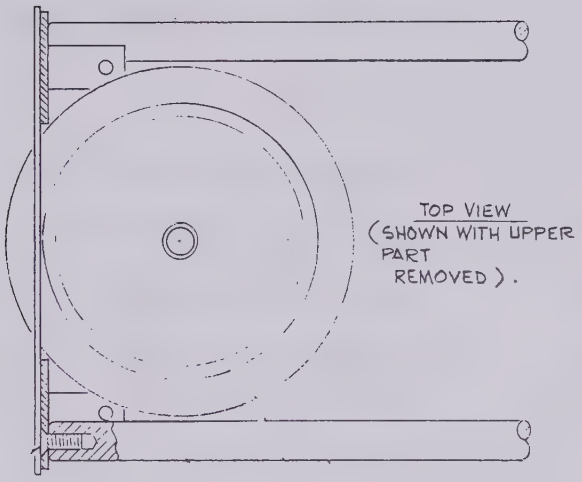
REF.	DESCRIPTION	SD PART NO.
CR4	Diode, 1N4151	CR0150
CR5	Diode, 1N4151	CR0150
CR6	Diode, 1N4151	CR0150
CR7	Diode, 1N4151	CR0150
CR8	Diode, 1N4151	CR0150
CR9	Diode, 1N4151	CR0150
CR10	Diode, 1N4151	CR0150
CR11	Diode, 1N4151	CR0150
CR12	Diode, 1N4151	CR0150
CR13	Diode, 1N4151	CR0150
CR14	Diode, HPA 2800	CR0363
CR15	Diode, HPA 2800	CR0363
CR16	Diode, HPA 2800	CR0363
CR17	Diode, 1N961 Zener	CR0201
CR18	Diode, 1N4151	CR0150
L1	Inductor, Tuning	39667-11
	Coil Form	E0289
L2	Inductor, 2.7 µH	L0048
L3	Inductor, Tuning	39667-12
	Coil Form	E0289
L4	Inductor, Tuning	39667-13
	Coil Form	E0289
L5	Inductor, 100 µH	L0073
L6	Inductor, .33 µH	L0161
L7	Inductor, 2.7 µH	L0048
L8	Inductor, 10 µH	L0153
L9	Inductor, 1 µH Tuning	39666-2
	Coil Form	E0304
L10	Inductor, 1 µH Tuning	39666-2
	Coil Form	E0304
L11	Inductor, 100 µH	L0073
L12	Not Used	
L13	Inductor, 100 µH	L0073
L14	Inductor, 2.7 µH	L0048
Q1	Transistor, 3N200 Dual	Q0311
Q2	Transistor, 3N200 Dual	Q0311
Q3	Transistor, 2N3640	Q0178
Q4	Transistor, 2N3646	Q0218
Q5	Transistor, 2N3640	Q0178

SLN-6353A PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

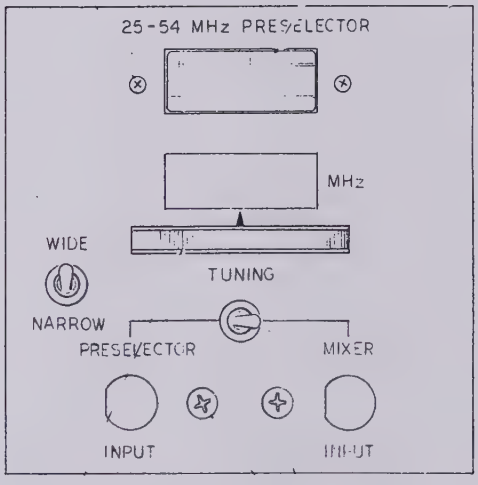
REF.	DESCRIPTION	SD PART NO.
Q6	Transistor, 2N3646	Q0218
Q7	Transistor, 2N3646	Q0218
Q8	Transistor, 2N3904	Q0247
Q9	Transistor, 2N3904	Q0247
Q10	Transistor, 2N3906	Q0248
R1	Resistor, 270 k, 1/4 W, 5%	R1622
R2	Resistor, 1.2 M, 1/4 W, 5%	R1299
R3	Resistor, 150 k, 1/4 W, 5%	R0961
R4	Resistor, 5.6 k, 1/4 W, 5%	R0821
R5	Resistor, 820 k, 1/4 W, 5%	R2153
R6	Resistor, 820 k, 1/4 W, 5%	R2153
R7	Resistor, 270 Ω, 1/4 W, 5%	R0694
R8	Resistor, 5.6 k, 1/4 W, 5%	R0821
R9	Resistor, 150 k, 1/4 W, 5%	R0961
R10	Not Used	
R11	Resistor, 15 k, 1/4 W, 5%	R0728
R12	Resistor, 15 k, 1/4 W, 5%	R0728
R13	Resistor, 8.2 k, 1/4 W, 5%	R0883
R14	Resistor, 1.5 k, 1/4 W, 5%	R0783
R15	Resistor, 5.6 k, 1/4 W, 5%	R0821
R16	Resistor, 150 k, 1/4 W, 5%	R0961
R17	Resistor, 2.2 k, 1/4 W, 5%	R0749
R18	Resistor, 330 Ω, 1/4 W, 5%	R0662
R19	Resistor, 220 Ω, 1/4 W, 5%	R0760
R20	Not Used	
R21	Resistor, 22 k, 1/4 W, 5%	R0768
R22	Resistor, 10 k, 1/4 W, 5%	R0766
R23	Resistor, 10 k, 1/4 W, 5%	R0766
R24	Resistor, 22 k, 1/4 W, 5%	R0768
R25	Resistor, 2.7 k, 1/4 W, 5%	R0937
R26	Resistor, 56 Ω, 1/4 W, 5%	R1554
R27	Resistor, 56 Ω, 1/4 W, 5%	R1554
R28	Resistor, 4.7 k, 1/4 W, 5%	R0892
R29	Resistor, 10 k, Potentiometer	R2383
R30	Resistor, 10 k, 1/4 W, 5%	R0766
R31	Resistor, 820 Ω, 1/4 W, 5%	R0762
R32	Resistor, 10 k, 1/4 W, 5%	R0766
R33	Resistor, 2.7 k, 1/4 W, 5%	R0937
R34	Resistor, 10 k, 1/4 W, 5%	R0766
R35	Resistor, 1 k, 1/4 W, 5%	R0765

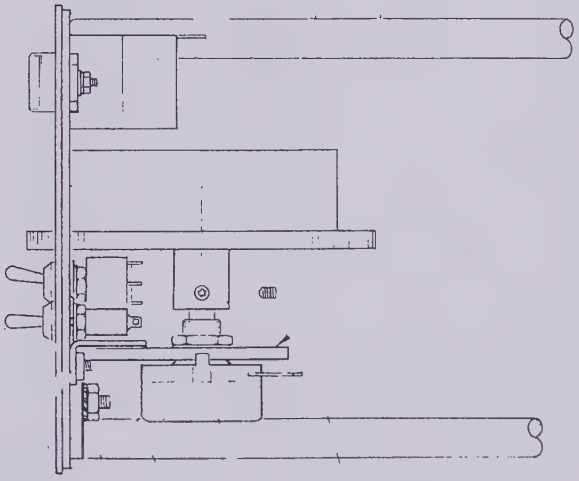
SLN-6353A PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

REF.	DESCRIPTION	SD PART NO.
R36	Resistor, 10 k, 1/4 W, 5%	R0766
R37	Resistor, 10 k, 1/4 W, 5%	R0766
R38	Resistor, 10 k, 1/4 W, 5%	R0766
R39	Resistor, 1 k, 1/4 W, 5%	R0765
R40	Resistor, 10 k, 1/4 W, 5%	R0766
R41	Resistor, 10 k, 1/4 W, 5%	R0766
R42	Resistor, 820 Ω, 1/4 W, 5%	R0762
R43	Resistor, 3.3 k, 1/4 W, 5%	R0742
R44	Resistor, 820 Ω, 1/4 W, 5%	R0762
R45	Resistor, 3.3 k, 1/4 W, 5%	R0742
R46	Resistor, 33 Ω, 1/4 W, 5%	R1550
R47	Resistor, 56 Ω, 1/4 W, 5%	R1554
R48	Resistor, 560 Ω, 1/4 W, 5%	R0819
R49	Resistor, 5.6 k, 1/4 W, 5%	R0821
R50	Resistor, 5.6 k, 1/4 W, 5%	R0821
R51	Resistor, 1 k, 1/4 W, 5%	R0765
R52	Resistor, 680 Ω, 1/4 W, 5%	R1234
R53	Resistor, 2.2 k, 1/4 W, 5%	R0749
R54	Resistor, 2.7 k, 1/4 W, 5%	R0937
R55	Resistor, 3.3 k, 1/4 W, 5%	R0742
R56	Resistor, 10 k, 1/4 W, 5%	R0766
R57	Resistor, 10 k, 1/4 W, 5%	R0766
R58	Resistor, 27 k, 1/4 W, 5%	R0824
R59	Resistor, 4.7 k, 1/4 W, 5%	R0892
R60	Resistor, 50 k, Potentiometer	R2363
R61	Resistor, 18 k, 1/4 W, 5%	R0785
R62	Resistor, 220 Ω, 1/4 W, 5%	R0760
R63	Resistor, 22 k, 1/4 W, 5%	R0768
R64	Resistor, 4.7 k, 1/4 W, 5%	R0892
R65	Resistor, 27 k, 1/4 W, 5%	R0824
R66	Resistor, 10 k, 1/4 W, 5%	R0766
R67	Resistor, 10 k, 1/4 W, 5%	R0766
R68	Resistor, 10 k, 1/4 W, 5%	R0766
R69	Resistor, 100 Ω, Potentiometer	R2374
R70	Resistor, 1 k, 1/4 W, 5%	R0765
R71	Resistor, 820 Ω, 1/4 W, 5%	R0762
R72	Resistor, 150 Ω, 1/4 W, 5%	R0983
R73	Resistor, 33 k, 1/4 W, 5%	R0780
U1	Integrated Circuit, MC1590G	25788
U2	Integrated Circuit, LM301A	25745
Y1	Crystal Filter	Y0049

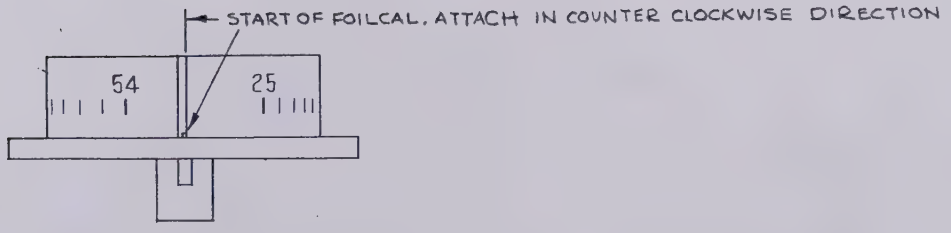


SEE DETAIL AT LOWER LEFT





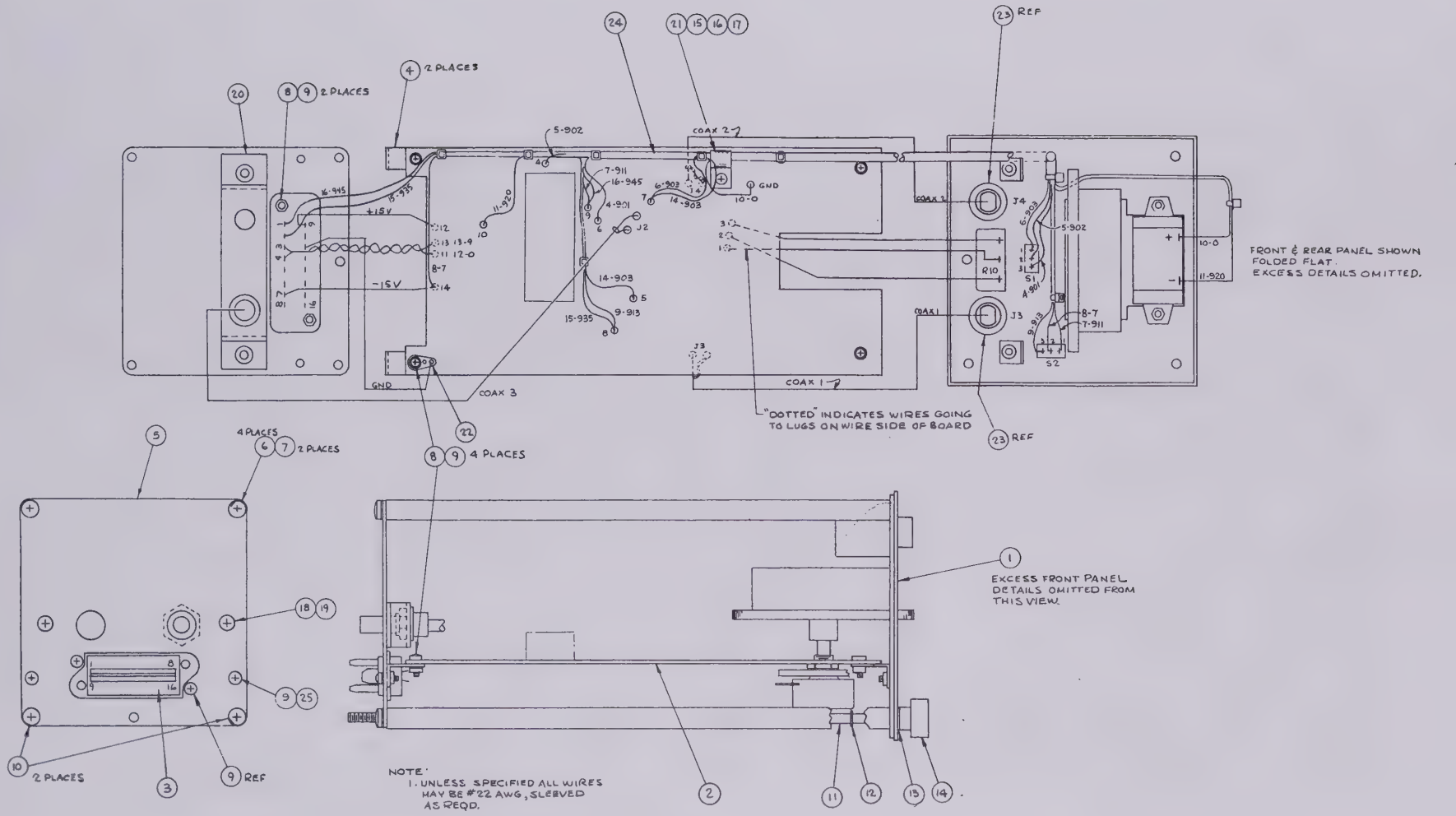
SLN-6353A, FRONT PANEL ASSEMBLY 45343



ASSY. DETAIL OF TUNING DRUM & FOILCAL

SLN-6353A PRESELECTOR FRONT PANEL ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Preselector, Front Panel Assembly	45343A
M1	Level Meter (MURA #TEH-15)	45302
R10	Potentiometer, Tune 100 k	R0408
S1	Switch, Toggle, Min. SPDT	S0149
S2	Switch, Toggle, Min. SPDT	S0149
	Assembly, Tuning Drum	45404

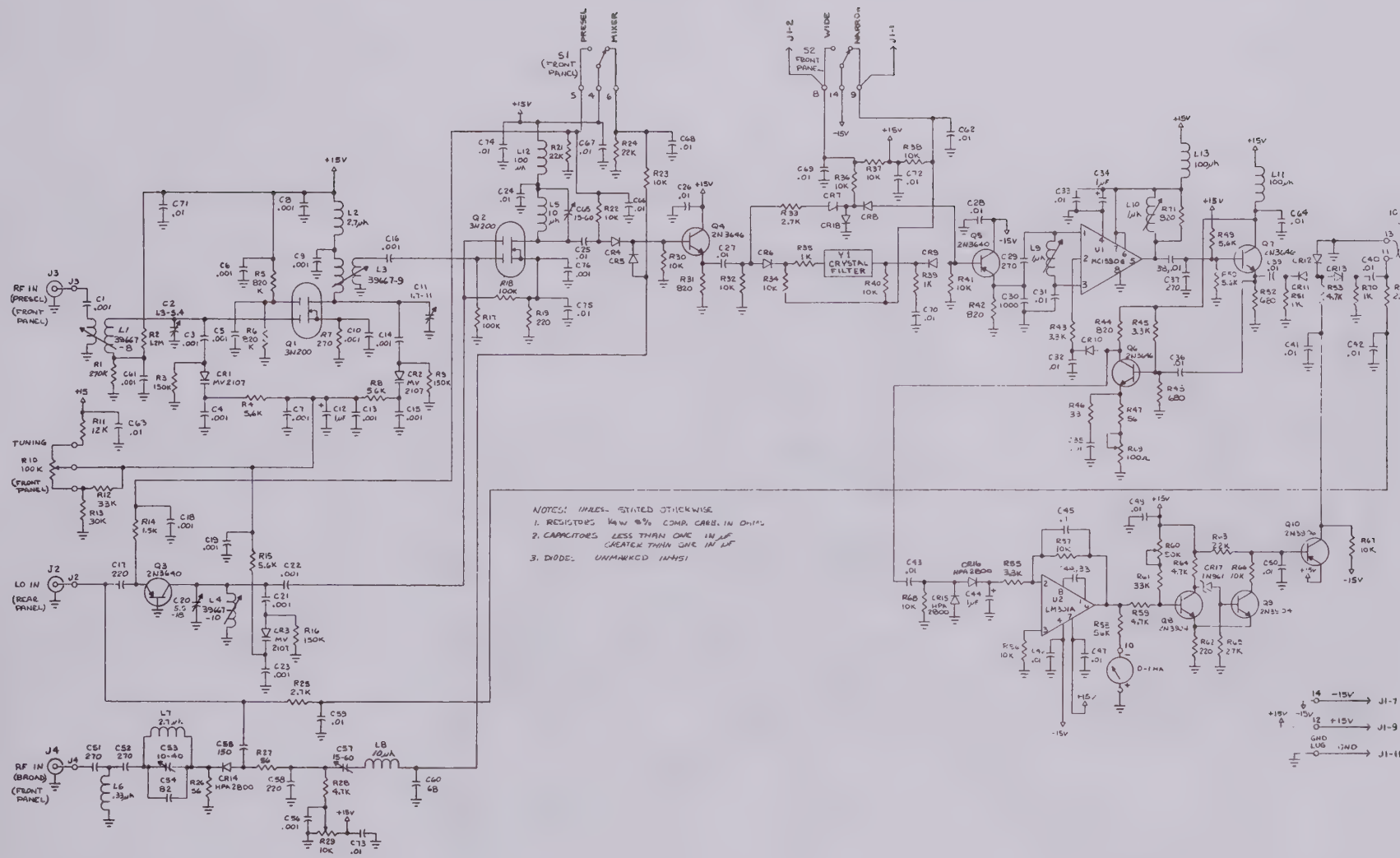


SLN-6353A, FINAL ASSEMBLY 45344

SLN-6353A PRESELECTOR FINAL ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Preselector Final Assembly	45344A
	BRKT, RF Connector	39631
	Knob	H1959
	Rod	37340
	Connector, 16 PIN	J0604

THIS SYMBOL INDICATES LUGS ON WIRE SIDE.



SLN-6354A, PRESELECTOR SCHEMATIC 45076

SLN-6354A PRESELECTOR P.C. ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Preselector P.C. Assembly	45079A
	Preselector P.C. Schematic	45076R1
C1	Capacitor, .001 µF, Ceramic, 75 V	C1155
C2	Capacitor, Trimmer 1.3-5.4 pF	C1254
C3	Capacitor, .001 µF, Ceramic Disc	C0424
C4	Capacitor, .001 µF, Ceramic, 75 V	C1155
C5	Capacitor, .001 µF, Ceramic, 75 V	C1155
C6	Capacitor, .001 µF, Ceramic, 75 V	C1155
C7	Capacitor, .001 µF, Ceramic, 75 V	C1155
C8	Capacitor, .001 µF, Ceramic, 75 V	C1155
C9	Capacitor, .001 µF, Ceramic, 75 V	C1155
C10	Capacitor, .001 µF, Ceramic, 75 V	C1155
C11	Capacitor, Trimmer 1.7-11 pF	C1255
C12	Capacitor, 1 µF, Tant. Electro	03290290
C13	Capacitor, .001 µF, Ceramic, 75 V	C1155
C14	Capacitor, .001 µF, Ceramic Disc	C0424
C15	Capacitor, .001 µF, Ceramic, 75 V	C1155
C16	Capacitor, .001 µF, Ceramic Disc	C0424
C17	Capacitor, 220 pF, D.M.	C1077
C18	Capacitor, .001 µF, Ceramic, 75 V	C1155
C19	Capacitor, .001 µF, Ceramic, 75 V	C1155
C20	Capacitor, Trimmer 5.5-18 pF	C0712
C21	Capacitor, .001 µF, Ceramic Disc	C0424
C22	Capacitor, .001 µF, Ceramic, 75 V	C1155
C23	Capacitor, .001 µF, Ceramic, 75 V	C1155
C24	Capacitor, .01 µF, Ceramic Disc	C0562
C25	Capacitor, .01 µF, Ceramic Disc	C0562
C26	Capacitor, .01 µF, Ceramic Disc	C0562
C27	Capacitor, .01 µF, Ceramic Disc	C0562
C28	Capacitor, .01 µF, Ceramic Disc	C0562
C29	Capacitor, 270 pF, D.M.	C1139
C30	Capacitor, 1000 pF, D.M.	C1144
C31	Capacitor, .01 µF, Ceramic Disc	C0562
C32	Capacitor, .001 µF, Ceramic Disc	C0424
C33	Capacitor, .01 µF, Ceramic Disc	C0562
C34	Capacitor, 1 µF Monol Ceramic	C0879
C35	Capacitor, .01 µF, Ceramic Disc	C0562
C36	Capacitor, .01 µF, Ceramic Disc	C0562
C37	Capacitor, 270 pF, D.M.	C1139
C38	Capacitor, .01 µF, Ceramic Disc	C0562
C39	Capacitor, .01 µF, Ceramic Disc	C0562

SLN-6354A PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

Ref.	Description	SD Part No.
C40	Capacitor, .01 µF, Ceramic Disc	C0562
C41	Capacitor, .01 µF, Ceramic Disc	C0562
C42	Capacitor, .01 µF, Ceramic Disc	C0562
C43	Capacitor, .01 µF, Ceramic Disc	C0562
C44	Capacitor, 1 µF, Tant. Electro	03290290
C45	Capacitor, .1 µF Monol Ceramic	C0881
C46	Capacitor, .01 µF, Ceramic Disc	C0562
C47	Capacitor, .01 µF, Ceramic Disc	C0562
C48	Capacitor, 33 pF D.M.	C0877
C49	Capacitor, .01 µF, Ceramic Disc	C0562
C50	Capacitor, .01 µF, Ceramic Disc	C0562
C51	Capacitor, 270 pF, D.M.	C1139
C52	Capacitor, 270 pF, D.M.	C1139
C53	Capacitor, Trimmer 10-40 pF	C0709
C54	Capacitor, 82 pF, D.M.	C0873
C55	Capacitor, 150 pF D.M.	C1076
C56	Capacitor, .001 µF, Ceramic, 75 V	C1155
C57	Capacitor, Trimmer 15-60 pF	C1132
C58	Capacitor, 220 pF, D.M.	C1077
C59	Capacitor, .01 µF, Ceramic Disc	C0562
C60	Capacitor, 150 pF, D.M.	C1076
C61	Capacitor, .001 µF, Ceramic, 75 V	C1155
C62	Capacitor, .01 µF, Ceramic Disc	C0562
C63	Capacitor, .01 µF, Ceramic Disc	C0562
C64	Capacitor, .01 µF, Ceramic Disc	C0562
C65	Capacitor, Trimmer 15-60 pF	C1132
C66	Capacitor, .01 µF, Ceramic Disc	C0562
C67	Capacitor, .01 µF, Ceramic Disc	C0562
C68	Capacitor, .01 µF, Ceramic Disc	C0562
C69	Capacitor, .01 µF, Ceramic Disc	C0562
C70	Capacitor, .01 µF, Ceramic Disc	C0562
C71	Capacitor, .01 µF, Ceramic Disc	C0562
C72	Capacitor, .01 µF, Ceramic Disc	C0562
C73	Capacitor, .01 µF, Ceramic Disc	C0562
C74	Capacitor, .01 µF, Ceramic Disc	C0562
C75	Capacitor, .01 µF, Ceramic Disc	C0562
C76	Capacitor, .001 µF, Ceramic, 75 V	C1155
CR1	Diode, Tuning MV 2107	CR0375
CR2	Diode, Tuning MV 2107	CR0375
CR3	Diode, Tuning MV 2107	CR0375
CR4	Diode, 1N4151	CR0150

SLN-6354A PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

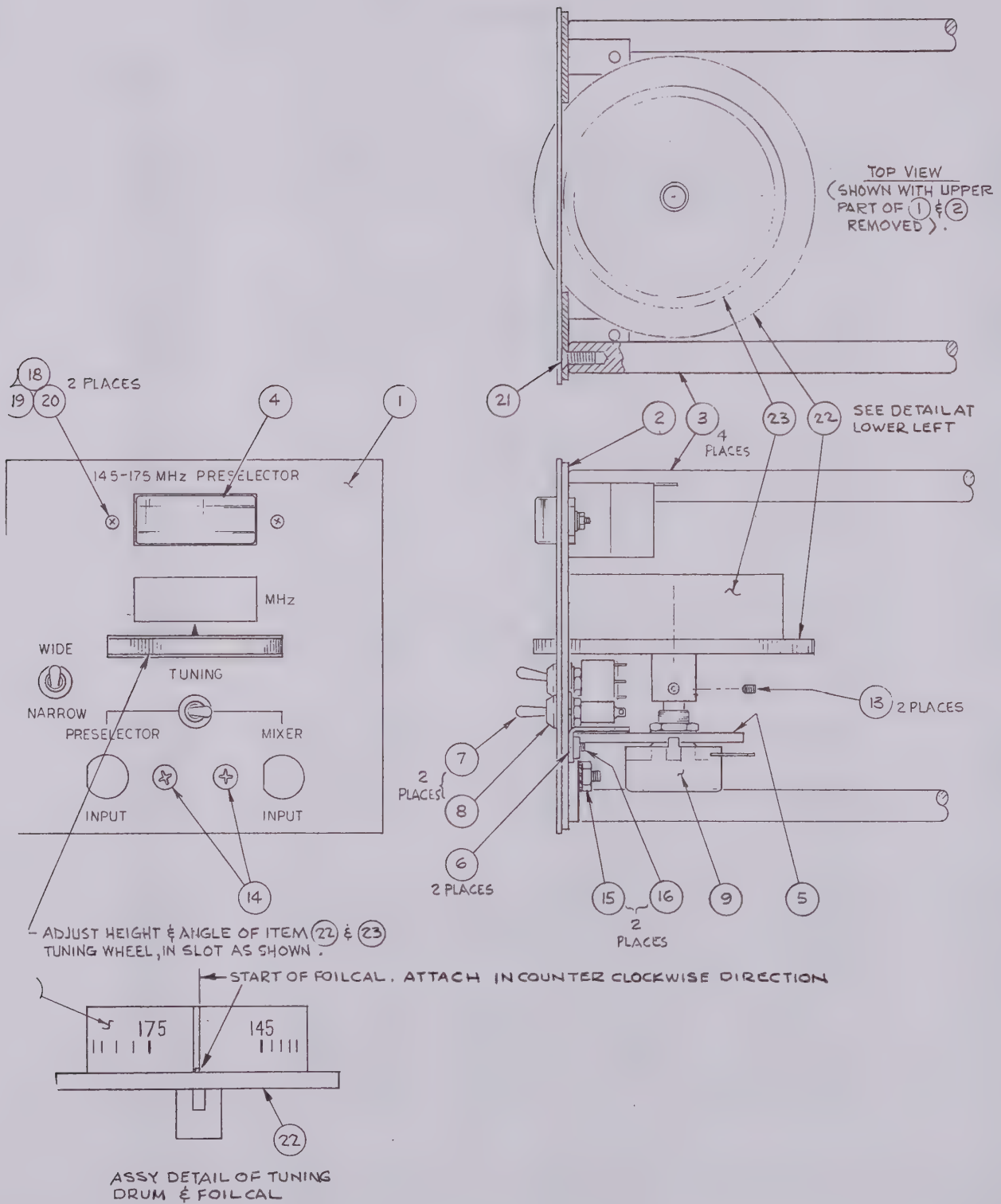
Ref.	Description	SD Part No.
CR5	Diode, Tuning MV 2107	CR0375
CR6	Diode, Tuning MV 2107	CR0375
CR7	Diode, Tuning MV 2107	CR0375
CR8	Diode, Tuning MV 2107	CR0375
CR9	Diode, Tuning MV 2107	CR0375
CR10	Diode, Tuning MV 2107	CR0375
CR11	Diode, Tuning MV 2107	CR0375
CR12	Diode, Tuning MV 2107	CR0375
CR13	Diode, Tuning MV 2107	CR0375
CR14	Diode, HPA 2800	CR0363
CR15	Diode, HPA 2800	CR0363
CR16	Diode, HPA 2800	CR0363
CR17	Diode, 1N961 Zener	CR0201
CR18	Diode, 1N4151	CR0150
L1	Inductor, Tuning	39667-8
	Brass Coil Form	E0289
L2	Inductor, 2.7 µH	L0048
L3	Inductor, Tuning	39667-9
	Coil Form	E0223
L4	Inductor, Tuning	39667-10
	Coil Form	E0289
L5	Inductor, 6.8 µH	L0053
L6	Inductor, .33 µH	L0161
L7	Inductor, 2.7 µH	L0048
L8	Inductor, 10 µH	L0153
L9	Inductor, 1 µH	39666-2
	Coil Form	E0304
L10	Inductor, 1 µH	39666-2
	Coil Form	E0304
L11	Inductor, 100 µH	L0073
L12	Inductor, 100 µH	L0073
L13	Inductor, 100 µH	L0073
Q1	Transistor, 3N200 Dual	Q0311
Q2	Transistor, 3N200 Dual	Q0311
Q3	Transistor, 2N3640	Q0178
Q4	Transistor, 2N3646	Q0218
Q5	Transistor, 2N3640	Q0178
Q6	Transistor, 2N3646	Q0218
Q7	Transistor, 2N3646	Q0218
Q8	Transistor, 2N3904	Q0247
Q9	Transistor, 2N3904	Q0247
Q10	Transistor, 2N3906	Q0248

SLN-6354A PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

Ref.	Description	SD Part No.
R1	Resistor, 270 k, 1/4 W, 5%	R1622
R2	Resistor, 1.2 μ, 1/4 W, 5%	R1299
R3	Resistor, 150 k, 1/4 W, 5%	R0961
R4	Resistor, 5.6 k, 1/4 W, 5%	R0821
R5	Resistor, 820 k, 1/4 W, 5%	R2153
R6	Resistor, 320 k, 1/4 W, 5%	R2153
R7	Resistor, 270 Ω, 1/4 W, 5%	R0694
R8	Resistor, 5.6 k, 1/4 W, 5%	R0821
R9	Resistor, 150 k, 1/4 W, 5%	R0961
R10	Not Used	
R11	Resistor, 12 k, 1/4 W, 5%, CC	R0759
R12	Resistor, 33 k, 1/4 W, 5%	R0780
R13	Resistor, 30 k, 1/4 W, 5%	R0715
R14	Resistor, 1.5 k, 1/4 W, 5%	R0783
R15	Resistor, 5.6 k, 1/4 W, 5%	R0821
R16	Resistor, 150 k, 1/4 W, 5%	R0961
R17	Resistor, 100 k, 1/4 W, 5%	R0741
R18	Resistor, 100 k, 1/4 W, 5%	R0741
R19	Resistor, 220 Ω, 1/4 W, 5%	R0760
R20	Not Used	
R21	Resistor, 22 k, 1/4 W, 5%	R0768
R22	Resistor, 10 k, 1/4 W, 5%	R0766
R23	Resistor, 10 k, 1/4 W, 5%	R0766
R24	Resistor, 22 k, 1/4 W, 5%	R0768
R25	Resistor, 2.7 k, 1/4 W, 5%	R0937
R26	Resistor, 56 Ω, 1/4 W, 5%	R1554
R27	Resistor, 56 Ω, 1/4 W, 5%	R1554
R28	Resistor, 4.7 k, 1/4 W, 5%	R0892
R29	Resistor, 10 k, Potentiometer	R2383
R30	Resistor, 10 k, 1/4 W, 5%	R0766
R31	Resistor, 820 Ω, 1/4 W, 5%	R0762
R32	Resistor, 10 k, 1/4 W, 5%	R0766
R33	Resistor, 2.7 k, 1/4 W, 5%	R0937
R34	Resistor, 10 k, 1/4 W, 5%	R0766
R35	Resistor, 1 k, 1/4 W, 5%	R0765
R36	Resistor, 10 k, 1/4 W, 5%	R0766
R37	Resistor, 10 k, 1/4 W, 5%	R0766
R38	Resistor, 10 k, 1/4 W, 5%	R0766
R39	Resistor, 1 k, 1/4 W, 5%	R0765
R40	Resistor, 10 k, 1/4 W, 5%	R0766
R41	Resistor, 10 k, 1/4 W, 5%	R0766

SLN-6354A PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

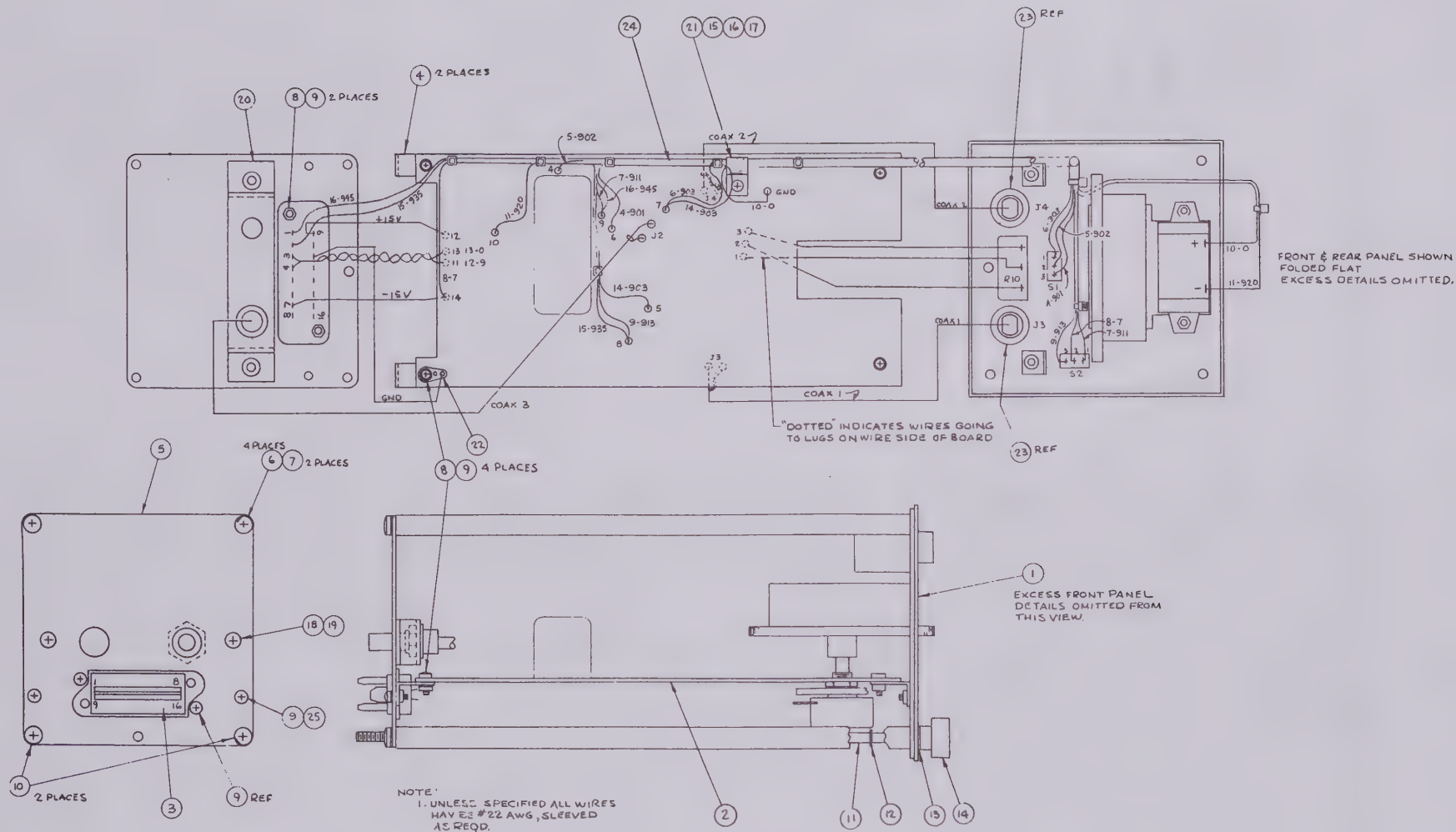
Ref.	Description	SD Part No.
R42	Resistor, 820 Ω, 1/4 W, 5%	R0762
R43	Resistor, 3.3 k, 1/4 W, 5%	R0742
R44	Resistor, 820 Ω, 1/4 W, 5%	R0762
R45	Resistor, 3.3 k, 1/4 W, 5%	R0742
R46	Resistor, 33 Ω, 1/4 W, 5%	R1550
R47	Resistor, 56 Ω, 1/4 W, 5%	R1554
R48	Resistor, 560 Ω, 1/4 W, 5%	R0819
R49	Resistor, 5.6 k, 1/4 W, 5%	R0821
R50	Resistor, 5.6 k, 1/4 W, 5%	R0821
R51	Resistor, 1 k, 1/4 W, 5%	R0765
R52	Resistor, 680 Ω, 1/4 W, 5%	R1234
R53	Resistor, 2.2 k, 1/4 W, 5%	R0749
R54	Resistor, 2.7 k, 1/4 W, 5%	R0937
R55	Resistor, 3.3 k, 1/4 W, 5%	R0742
R56	Resistor, 10 k, 1/4 W, 5%	R0766
R57	Resistor, 10 k, 1/4 W, 5%	R0766
R58	Resistor, 56 k, 1/4 W, 5%	R1235
R59	Resistor, 4.7 k, 1/4 W, 5%	R0892
R60	Resistor, 50 k, Potentiometer	R2368
R61	Resistor, 18 k, 1/4 W, 5%	R0785
R62	Resistor, 220 Ω, 1/4 W, 5%	R0760
R63	Resistor, 22 k, 1/4 W, 5%	R0768
R64	Resistor, 4.7 k, 1/4 W, 5%	R0892
R65	Resistor, 27 k, 1/4 W, 5%	R0824
R66	Resistor, 10 k, 1/4 W, 5%	R0766
R67	Resistor, 10 k, 1/4 W, 5%	R0766
R68	Resistor, 10 k, 1/4 W, 5%	R0766
R69	Resistor, 100 Ω, Potentiometer	R2374
R70	Resistor, 1 k, 1/4 W, 5%	R0765
R71	Resistor, 820 Ω, 1/4 W, 5%	R0762
U1	Integrated Circuit, MC1590G	25788
U2	Integrated Circuit, LM301A	25745
Y1	Crystal Filter	Y0049



SLN-6354A, FRONT PANEL ASSEMBLY 45174

SLN-6354A PRESELECTOR FRONT PANEL ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Preselector Front Panel Assembly	45174A
	Assembly, Tuning Drum	45404
M1	Level Meter (MURA #TEG-15)	45302
R10	Potentiometer, Tune 100 k	R0408
S1	Switch, Toggle, Min. SPDT	S0149
S2	Switch, Toggle, Min. SPDT	S0149



SLN-6354A, FINAL ASSEMBLY 45075

SLN-6354A PRESELECTOR FINAL ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Preselector Final Assembly	45075A
	Knob	H1959
	Rod	37340
	Connector, 16 PIN	J0604

CIRCUIT DESCRIPTION
PRESELECTOR PLUG-INS
MODELS SLN-6355A & SLN-6369A

1) CIRCUIT DESCRIPTION

The preselector contains all the circuitry required to amplify the received signal, to convert this signal to the 10 MHz IF, to amplify the IF, and to detect the proper level which activates the squelch. All tuning of the RF amplifier stage and the local oscillator amplifier stage is done by voltage variable capacitors. Diode switches are used to switch modes and IF bandwidths. A separate hot carrier diode mixer is used for the broadband mixer portion.

The input signal is amplified by a two stage, double tuned amplifier consisting of a grounded base stage (Q1) and a dual gate FET (Q2). Trimming is accomplished by use of printed circuit lines and voltage variable capacitors, with adjustable trimmer capacitors to set the tracking points. The local oscillator signal is amplified and tuned in a similar manner. Both signals are now applied to mixer Q3 which produces the 10 MHz IF. Network L3 and C13 provides a low impedance path at 10 MHz for the LO input to the mixer.

Signals applied to the broadband MIXER input of the plug-in are first filtered by network L10, C30, and C31 to remove any 10 MHz component. The signal is then mixed with the local oscillator in diode CR4, and fed through a series-tuned 10 MHz filter which rejects any component not at the desired 10 MHz IF.

Diode switches CR5 and CR6 are used to select either the PRESELECTOR signal or the MIXER signal and feed it through emitter follower Q6 into the IF bandwidth switching network, which is composed of crystal filter Y1 and a diode switch bypass. When the NARROW mode is selected, diodes CR8 and CR11 are turned on, diodes CR7 and CR10 are turned off, and the signal is routed through the crystal filter. In the WIDE mode, the diode switch positions are reversed and the signal bypasses the filter. Emitter follower Q7 provides a low impedance source to drive the IF amplifier.

The 10 MHz signal from the bandwidth switching network is further amplified by a high gain AGC type amplifier. Integrated circuit U1, tuned on both input and output, provides the gain; and transistor Q8 acts as an adjustable threshold AGC amplifier. By adjusting R46 the point at which AGC action begins may be set.

The output of Q8 is also used to drive the "level detect" circuit. A voltage dougler, composed of two hot-carrier type diodes (CR16 and 17), peak detects the 10 MHz signal and supplies a dc voltage to amplifier U2. This amplifier has a gain of three and additionally provides the required low output impedance to drive the tuning meter and Schmitt trigger Q10, Q11. The "trip Point"

of the Schmitt trigger is adjustable with R61 and is set, such that, the monitor will turn on at a point where the signal is strong enough for proper quieting. Transistor Q12 provides the required voltage level to operate the output diode switch and allows a 10 MHz signal to be supplied to the Monitor Mainframe.

2) MAINTENANCE & CALIBRATION (SLN-6355A & SLN-6369A)

No routine maintenance other than periodic dusting of the plug-in with a soft brush is required. To recalibrate the plug-in, a variable amplitude signal generator will be required. The following adjustment procedure assumes that the unit is not totally misadjusted, i.e. it is possible to turn on the Monitor with a sufficiently strong signal.

a) Dial and tune in a frequency which is 1.1 MHz above the lower band edge and set the signal generator to give a zero frequency error reading on the error meter (15 KHz range). If possible, the tuning meter should be about half scale.

b) Using a nonmetallic tuning tool with a 3/32" wide blade, adjust L12 & L14 for a maximum tuning meter reading, reducing the generator amplitude as needed to keep the needle about half scale. Then adjust C16 for a maximum reading.

c) Carefully adjust C10 and C24 for a maximum tuning meter reading, again reducing the generator amplitude, as required.

d) Dial and tune in a frequency which is 1 MHz below the upper band edge and set the signal generator to give a zero error reading on the error meter (15 KHz range). The tuning meter should be about half scale.

e) Adjust C4, C7, and C22 for a maximum reading on the tuning meter, reducing the generator amplitude as needed.

f) Dial and tune in a frequency approximately in the center of the tuning range and set the generator to give a zero error reading on the error meter (15 KHz range). The tuning meter should be about half scale. Now adjust C70 for a maximum meter reading.

g) Repeat steps a) through f) (omitting step b) until no significant improvement in sensitivity is obtainable. This series of adjustments has aligned the RF and LO amplifier tracking.

h) Using whatever frequency is presently set up, increase the signal generator amplitude and adjust R46 such that the tuning meter does not go off scale at the high end with a signal of 10 mV.

i) Reduce the signal amplitude; and, with the preselector in WIDE, adjust R61 such that the Monitor comes on with about 1 kHz of deviation present (noise). The signal generator output level should now be below 20 μV. Note that the use of NARROW reduces the noise significantly.

j) Connect the signal generator to the MIXER input, select MIXER mode, and increase the amplitude until the tuning meter reads about half scale with a zero frequency error reading (15 KHz range).

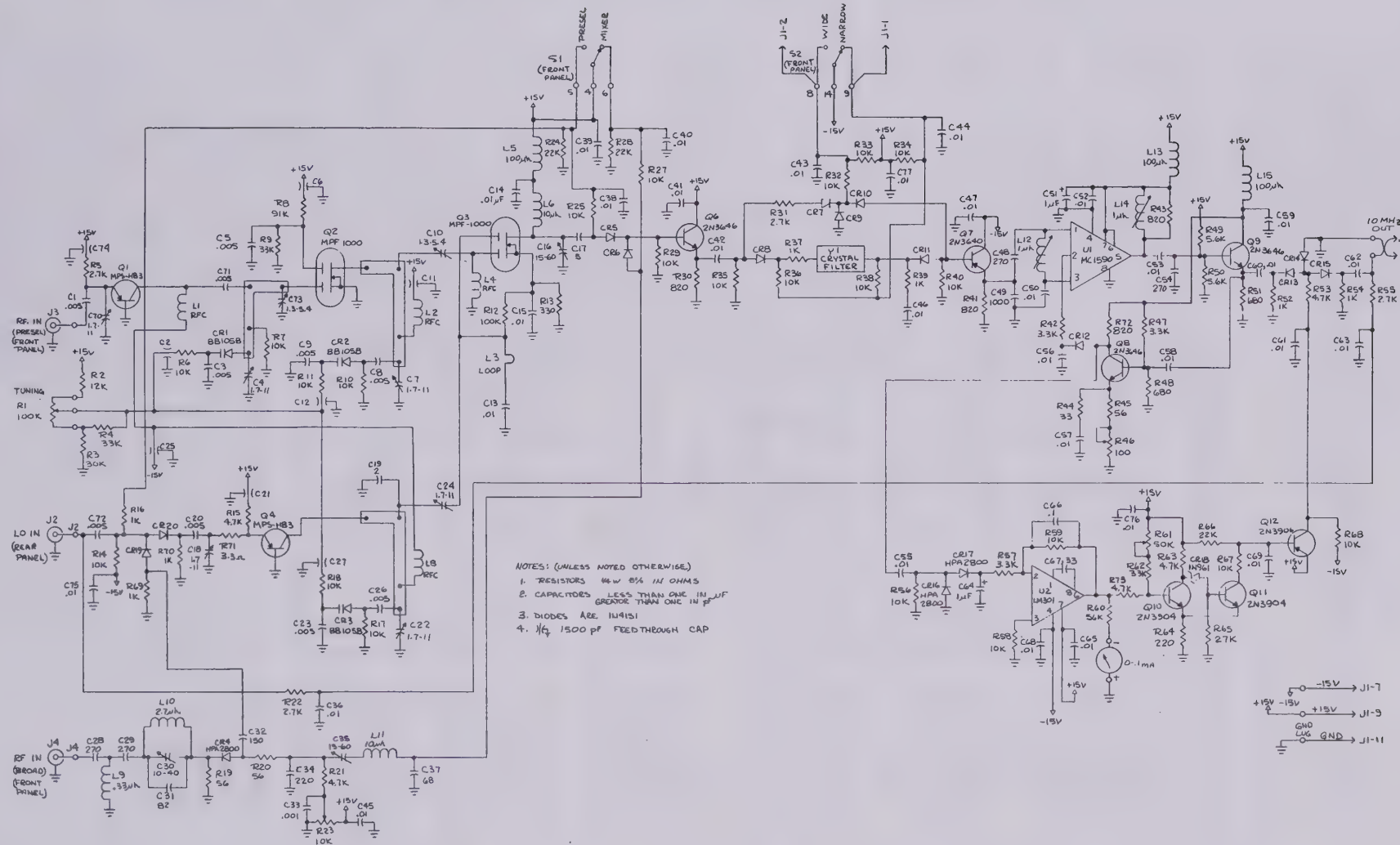
k) Adjust C35 and R23 for a maximum tuning meter reading, reducing the generator amplitude as required.

l) Connect the Synthesizer IF OUT to the MIXER input, select IF MODE and dial in 10 MHz. Adjust the IF level control for a half scale reading on the tuning meter.

m) Adjust C30 for a minimum reading on the tuning meter. This adjusts the 10 MHz trap.

In the event that the preselector is so out of adjustment that the Monitor cannot be turned on, a high sensitivity 10 MHz oscilloscope will have to be used for initial tune up. Follow step l) above, except increase the signal until an output is obtained on the emitter of Q6 (peak C35). Next monitor the emitter of Q9 and adjust L12 & L14 for maximum. Always reduce the input signal amplitude to the lowest value which can be used. Now align the preselector according to the above procedure (a through m).

SLN-6355A, PRESELECTOR P.C., ASSEMBLY 45332



SLN-6355A, PRESELECTOR SCHEMATIC 45329

SLN-6355A,PRESELECTOR P.C. ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Preselector P.C. Board Assembly	45332A
	Preselector P.C. Board Schematic	45329R1
C1	Capacitor, Chip, .005 µF	C1245
C2	Capacitor, Feed Through, 1500 pF	C6014
C3	Capacitor, Chip, .005 µF	C1245
C4	Capacitor, Trimmer, 1.7011 pF	C1293
C5	Capacitor, Chip, .005 µF	C1245
C6	Capacitor, Feed Through, 1500 pF	C6014
C7	Capacitor, Trimmer, 1.7011 pF	C1293
C8	Capacitor, Chip, .005 µF	C1245
C9	Capacitor, Chip, .005 µF	C1245
C10	Capaciotr, Trimmer, 1.3-5.4 pF	C1254
C11	Capacitor, Feed Through, 1500 pF	C6014
C12	Capacitor, Feed Through, 1500 pF	C6014
C13	Capacitor, Ceramic Disc, .01 µF	C0562
C14	Capacitor, Ceramic Disc, .01 µF	C0562
C15	Capacitor, Ceramic Disc, .01 µF	C0562
C16	Capacitor, Trimmer, 15-60 pF	C1132
C17	Capacitor, D.M., 5 pF	C1071
C18	Capacitor, Trimmer, 1.7-11 pF	C1255
C19	Capacitor, D.M., 2 pF	03175030
C20	Capacitor, Chip, .005 µF	C1245
C21	Capacitor, Feed Through, 1500 pF	C6014
C22	Capacitor, Trimmer, 1.7-11 pF	C1255
C23	Capacitor, Chip, .005 µF	C1245
C24	Capacitor, Trimmer, 1.7-11 pF	C1255
C25	Capacitor, Feed Through, 1500 pF	C6014
C26	Capacitor, Chip, .005 µF	C1245
C27	Capacitor, Feed Through, 1500 pF	C6014
C28	Capacitor, D.M., 270 pF	C1139
C29	Capacitor, D.M., 270 pF	C1139
C30	Capacitor, Trimmer, 10-40 pF	C0709
C31	Capacitor, D.M., 82 pF	C0873
C32	Capacitor, D.M., 150 pF	C1076
C33	Capacitor, Ceramic Disc, .001 µF, 75 V	C1155
C34	Capacitor, D.M., 200 pF	C1077
C35	Capacitor, Trimmer, 15-60 pF	C1132

SLN-6355A,PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

Ref.	Description	SD Part No.
C36	Capacitor, Feed Through, 1500 pF	C6014
C37	Capacitor, D.M., 68 pF	C1140
C38	Capacitor, Ceramic Disc, .01 µF	C0562
C39	Capacitor, Ceramic Disc, .01 µF	C0562
C40	Capacitor, Ceramic Disc, .01 µF	C0562
C41	Capacitor, Ceramic Disc, .01 µF	C0562
C42	Capacitor, Ceramic Disc, .01 µF	C0562
C43	Capacitor, Ceramic Disc, .01 µF	C0562
C44	Capacitor, Ceramic Disc, .01 µF	C0562
C45	Capacitor, Ceramic Disc, .01 µF	C0562
C46	Capacitor, Ceramic Disc, .01 µF	C0562
C47	Capacitor, Ceramic Disc, .01 µF	C0562
C48	Capacitor, D.M., 270 pF	C1139
C49	Capacitor, D.M., 1000 pF	C1144
C50	Capacitor, Ceramic Disc, .01 µF	C0562
C51	Capacitor, Ceramic Disc, Mono, 1 µF	C0562
C52	Capacitor, Ceramic Disc, .01 µF	C0562
C53	Capacitor, Ceramic Disc, .01 µF	C0562
C54	Capacitor, D.M., 270 pF	C1139
C55	Capacitor, Ceramic Disc, .01 µF	C0562
C56	Capacitor, Ceramic Disc, .01 µF	C0562
C57	Capacitor, Ceramic Disc, .01 µF	C0562
C58	Capacitor, Ceramic Disc, .01 µF	C0562
C59	Capacitor, Ceramic Disc, .01 µF	C0562
C60	Capacitor, Ceramic Disc, .01 µF	C0562
C61	Capacitor, Ceramic Disc, .01 µF	C0562
C62	Capacitor, Ceramic Disc, .01 µF	C0562
C63	Capacitor, Ceramic Disc, .01 µF	C0562
C64	Capacitor, Electro Tant., 1 µF	03290290
C65	Capacitor, Ceramic Disc, .01 µF	C0562
C66	Capacitor, Ceramic Disc, Mono, .1 µF	C0881
C67	Capacitor, D.M., 33 pF	C0877
C68	Capacitor, Ceramic Disc, .01 µF	C0562
C69	Capacitor, Ceramic Disc, .01 µF	C0562
C70	Capacitor, Trimmer, 1.7-11 pF	C1255
C71	Capacitor, Chip, .005 µF	C1245
C72	Capacitor, Chip, .005 µF	C1245
C73	Capacitor, Trimmer, 1.3-5.4 pF	C1294
C74	Capacitor, Feed Through, 1500 pF	C6014
C75	Capacitor, Ceramic Disc, .01 µF	C0562
C76	Capacitor, Ceramic Disc, .01 µF	C0562
C77	Capacitor, Ceramic Disc, .01 µF	C0562

SLN-6355A, PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

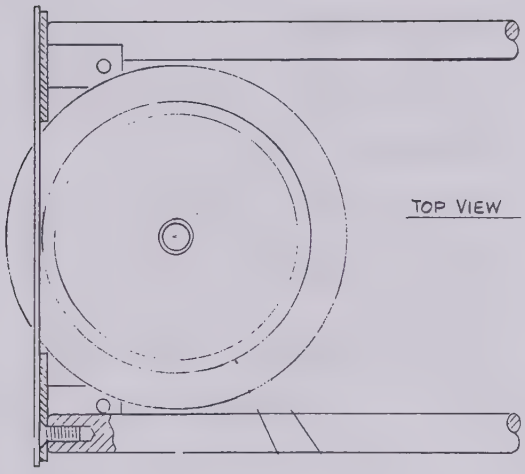
Ref.	Description	SD Part No.
CR1	Diode, BB105 B	CR0383
CR2	Diode, BB105 B	CR0383
CR3	Diode, BB105 B	CR0383
CR4	Diode, HPA 2800	CR0363
CR5	Diode, 1N4151	CR0150
CR6	Diode, 1N4151	CR0150
CR7	Diode, 1N4151	CR0150
CR8	Diode, 1N4151	CR0150
CR9	Diode, 1N4151	CR0150
CR10	Diode, 1N4151	CR0150
CR11	Diode, 1N4151	CR0150
CR12	Diode, 1N4151	CR0150
CR13	Diode, 1N4151	CR0150
CR14	Diode, 1N4151	CR0150
CR15	Diode, 1N4151	CR0150
CR16	Diode, HPA 2800	CR0363
CR17	Diode, HPA 2800	CR0363
CR18	Diode, Zener IN961	CR0201
CR19	Diode, 1N4151	CR0150
CR20	Diode, 1N4151	CR0150
L1	Inductor, 5 turn X 1/8" I.D. #22 Wire	45412
L2	Inductor, 5 turn X 1/8" I.D. #22 Wire	45412
L3	Inductor, Loop 1/2 I.D. X 1/2 High	45413
L4	Inductor, 5 turn X 1/8" I.D. #22 Wire	45412
L5	Inductor, 100 µH	L0073
L6	Inductor, 10 µH	L0153
L8	Inductor, 5 turn X 1/8" I.D. #22 Wire	45412
L9	Inductor, .33 µH	L0161
L10	Inductor, 2.7 µH	L0048
L11	Inductor, 10 µH	L0153
L12	Inductor, 1 µH Tuning	39666-2
L13	Inductor, 100 µH	L0073
L14	Inductor, 1 µH Tuning	39666-2
L15	Inductor, 100 µH	L0073
Q1	Transistor, MPS-H83	Q0314
Q2	Transistor, MPF-1000	Q0315
Q3	Transistor, MPF-1000	Q0315
Q4	Transistor, MPS-H83	Q0314
Q6	Transistor, 2N3646	Q0218
Q7	Transistor, 2N3640	Q0178
Q8	Transistor, 2N3646	Q0218
Q9	Transistor, 2N3646	Q0218
Q10	Transistor, 2N3904	Q0247

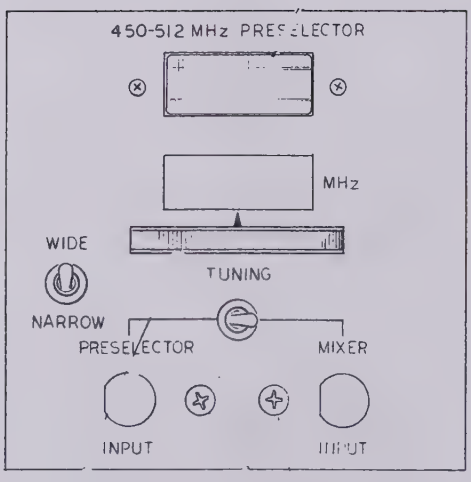
SLN-6355A, PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

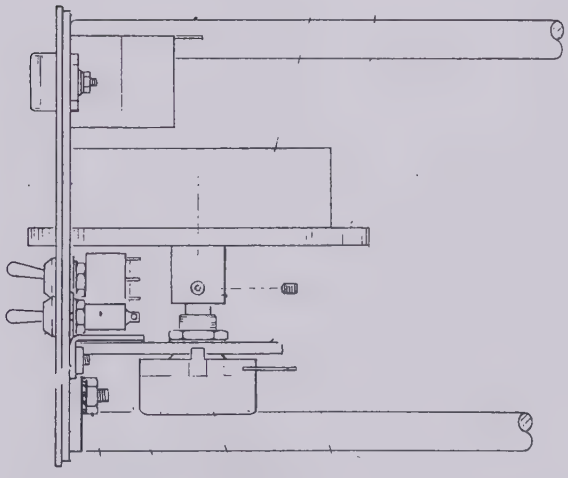
Ref.	Description	SD Part No.
Q11	Transistor, 2N3904	Q0247
Q12	Transistor, 2N3906	Q0248
R2	Resistor, 12k 1/4 W 5% C.C.	R0759
R3	Resistor, 30k 1/4 W 5% C.C.	R0715
R4	Resistor, 33k 1/4 W 5% C.C.	R0780
R5	Resistor, 2.7k 1/4 W 5% C.C.	R0937
R6	Resistor, 10k 1/4 W 5% C.C.	R0766
R7	Resistor, 10k 1/4 W 5% C.C.	R0766
R8	Resistor, 91k 1/4 W 5% C.C.	R1481
R9	Resistor, 33k 1/4 W 5% C.C.	R0780
R10	Resistor, 10k 1/4 W 5% C.C.	R0766
R11	Resistor, 10k 1/4 W 5% C.C.	R0766
R12	Resistor, 100k 1/4 W 5% C.C.	R0741
R13	Resistor, 330Ω 1/4 W 5% C.C.	R0662
R14	Resistor, 10k 1/4 W 5% C.C.	R0766
R15	Resistor, 4.7k 1/4 W 5% C.C.	R0892
R16	Resistor, 1k 1/4 W 5% C.C.	R0765
R17	Resistor, 10k 1/4 W 5% C.C.	R0766
R18	Resistor, 10k 1/4 W 5% C.C.	R0766
R19	Resistor, 56Ω 1/4 W 5% C.C.	R1554
R20	Resistor, 56Ω 1/4 W 5% C.C.	R1554
R21	Resistor, 4.7k 1/4 W 5% C.C.	R0892
R22	Resistor, 2.7k 1/4 W 5% C.C.	R0937
R23	Resistor, POT. 10k 1/4 W 5% C.C.	R2383
R24	Resistor, 22k 1/4 W 5% C.C.	R0768
R25	Resistor, 10k 1/4 W 5% C.C.	R0766
R27	Resistor, 10k 1/4 W 5% C.C.	R0766
R28	Resistor, 22k 1/4 W 5% C.C.	R0768
R29	Resistor, 10k 1/4 W 5% C.C.	R0766
R30	Resistor, 820Ω 1/4 W 5% C.C.	R0762
R31	Resistor, 2.7k 1/4 W 5% C.C.	R0937
R32	Resistor, 10k 1/4 W 5% C.C.	R0766
R33	Resistor, 10k 1/4 W 5% C.C.	R0766
R34	Resistor, 10k 1/4 W 5% C.C.	R0766
R35	Resistor, 10k 1/4 W 5% C.C.	R0766
R36	Resistor, 10k 1/4 W 5% C.C.	R0766
R37	Resistor, 1k 1/4 W 5% C.C.	R0765
R38	Resistor, 10k 1/4 W 5% C.C.	R0766
R39	Resistor, 1k 1/4 W 5% C.C.	R0765
R40	Resistor, 10k 1/4 W 5% C.C.	R0766
R41	Resistor, 820Ω 1/4 W 5% C.C.	R0762
R42	Resistor, 3.3k 1/4 W 5% C.C.	R0742

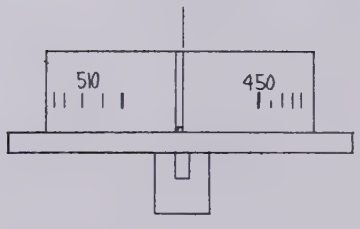
SLN-6355A, PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

Ref.	Description	SD Part No.
R43	Resistor, 820Ω 1/4 W 5% C.C.	R0762
R44	Resistor, 33Ω 1/4 W 5% C.C.	R1550
R45	Resistor, 56Ω 1/4 W 5% C.C.	R1554
R46	Resistor, POT. 100 1/4 W 5% C.C.	R2374
R47	Resistor, 3.3k 1/4 W 5% C.C.	R0742
R48	Resistor, 680Ω 1/4 W 5% C.C.	R1234
R49	Resistor, 5.6k 1/4 W 5% C.C.	R0821
R50	Resistor, 5.6k 1/4 W 5% C.C.	R0821
R51	Resistor, 680Ω 1/4 W 5% C.C.	R1234
R52	Resistor, 1k 1/4 W 5% C.C.	R0765
R53	Resistor, 4.7k 1/4 W 5% C.C.	R0892
R54	Resistor, 1k 1/4 W 5% C.C.	R0765
R55	Resistor, 2.7k 1/4 W 5% C.C.	R0937
R56	Resistor, 10k 1/4 W 5% C.C.	R0766
R57	Resistor, 3.3k 1/4 W 5% C.C.	R0742
R58	Resistor, 10k 1/4 W 5% C.C.	R0766
R59	Resistor, 10k 1/4 W 5% C.C.	R0766
R60	Resistor, 56k 1/4 W 5% C.C.	R1235
R61	Resistor, POT, 50k 1/4 W 5% C.C.	R2368
R62	Resistor, 33k 1/4 W 5% C.C.	R0780
R63	Resistor, 4.7k 1/4 W 5% C.C.	R0892
R64	Resistor, 220Ω 1/4 W 5% C.C.	R0760
R65	Resistor, 27k 1/4 W 5% C.C.	R0824
R66	Resistor, 22k 1/4 W 5% C.C.	R0768
R67	Resistor, 10k 1/4 W 5% C.C.	R0766
R69	Resistor, 1k 1/4 W 5% C.C.	R0765
R70	Resistor, 1k 1/4 W 5% C.C.	R0765
R71	Resistor, 3.3Ω 1/4 W 5% C.C.	R2496
R72	Resistor, 820Ω 1/4 W 5% C.C.	R0762
R73	Resistor, 4.7k 1/4 W 5% C.C.	R0892
U1	Integrated Circuit, MC1590G	25788
U2	Integrated Circuit, LM301A	25745
Y1	Crystal Filter, 10 MHz	Y0049





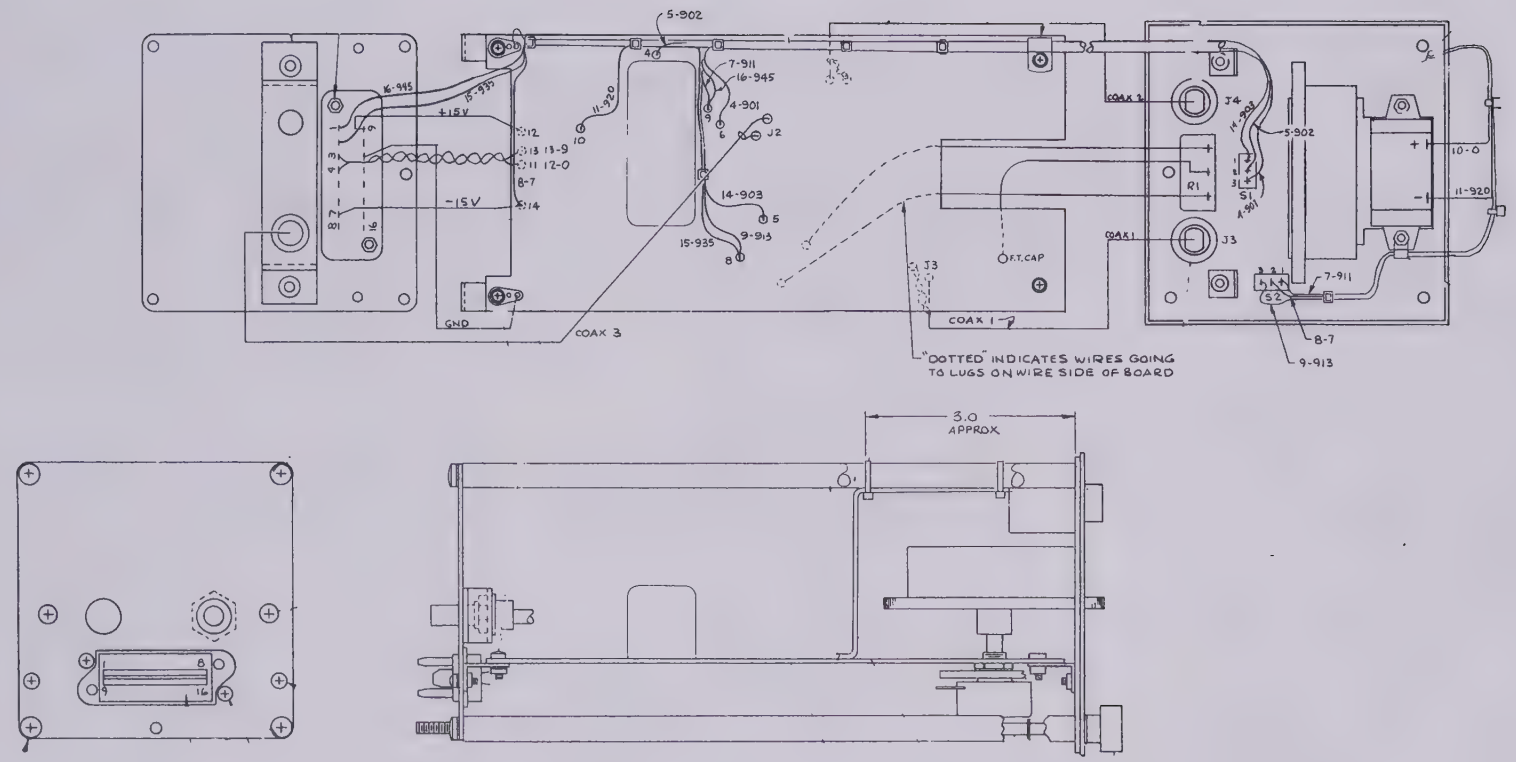




SLN-6355A, PRESELECTOR FRONT PANEL ASSEMBLY 45427

SLN-6355A, PRESELECTOR FRONT PANEL ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Preselector Front Panel Assembly	45427A
	Assembly, Tuning Drum	45404
M1	Level Meter (MURA #TEH-15)	45302
R1	Potentiometer, Tune 100 k	R0408
S1	Switch, Toggle, Min. SPDT	S0149
S2	Switch, Toggle, Min. SPDT	S0149

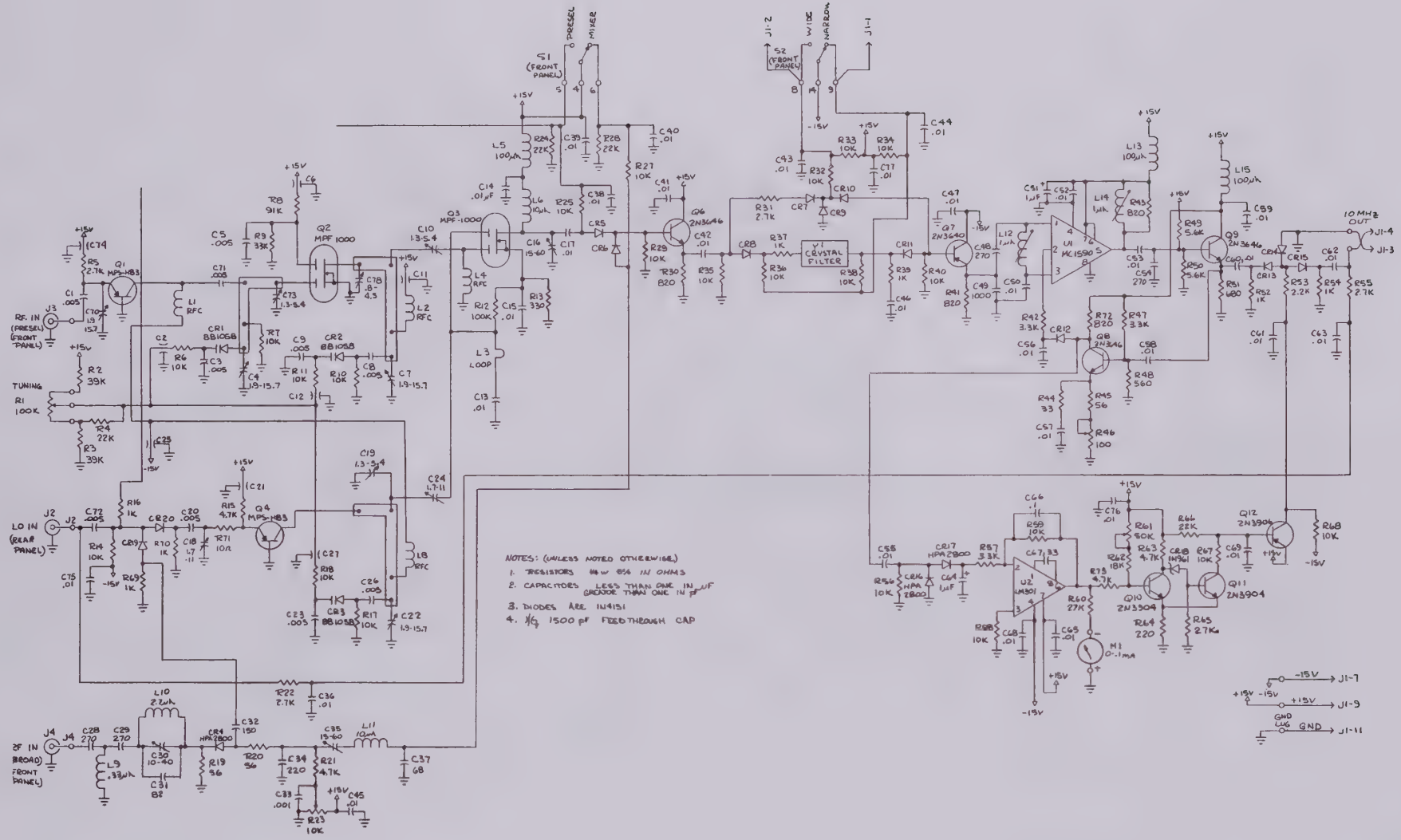


SLN-6355A, PRESELECTOR FINAL ASSEMBLY 45428

SLN-6355A, PRESELECTOR FINAL ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Preselector Final Assembly	45428R1
	Knob	H1959
	Rod	37340
	Connector, 16 Pin	J0604

SLN-6369A, PRESELECTOR P.C. ASSEMBLY 45473



SLN-6369A, PRESELECTOR SCHEMATIC 45470

SLN-6369A, PRESELECTOR P.C. ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Preselector P.C. Board Assembly	D45473A
	Preselector P.C. Board Schematic	D45470A
C1	Capacitor, Chip, .005 µF	C1245
C2	Capacitor, Feed Through, 1500 pF	C6014
C3	Capacitor, Chip, .005 µF	C1245
C4	Capacitor, Trimmer, 1.9-15.7 pF	C1299
C5	Capacitor, Chip, .005 µF	C1245
C6	Capacitor, Feed Through, 1500 pF	C6014
C7	Capacitor, Trimmer, 1.9-15.7 pF	C1299
C8	Capacitor, Chip, .005 µF	C1245
C9	Capacitor, Chip, .005 µF	C1245
C10	Capacitor, Trimmer, 1.3-5.4 pF	C1254
C11	Capacitor, Feed Through, 1500 pF	C6014
C12	Capacitor, Feed Through, 1500 pF	C6014
C13	Capacitor, Ceramic Disc, .01 µF	C0562
C14	Capacitor, Ceramic Disc, .01 µF	C0562
C15	Capacitor, Ceramic Disc, .01 µF	C0562
C16	Capacitor, Trimmer, 15-60 pF	C1132
C17	Capacitor, Ceramic Disc, .01 µF	C0562
C18	Capacitor, Trimmer, 1.7-11 pF	C1255
C19	Capacitor, Trimmer, 1.3-5.4 pF	C1254
C20	Capacitor, Chip, .005 µF	C1245
C21	Capacitor, Feed Through, 1500 pF	C6014
C22	Capacitor, Trimmer, 1.9-15.7 pF	C1298
C23	Capacitor, Chip, .005 µF	C1245
C24	Capacitor, Trimmer, 1.7-11 pF	C1255
C25	Capacitor, Feed Through, 1500 pF	C6014
C26	Capacitor, Chip, .005 µF	C1245
C27	Capacitor, Feed Through, 1500 pF	C6014
C28	Capacitor, D.M.,270 pF	C1139
C29	Capacitor, D.M.,270 pF	C1139
C30	Capacitor, Trimmer, 10-40 pF	C0709
C31	Capacitor, D.M., 82 pF	C0873
C32	Capacitor, D.M., 150 pF	C1076
C33	Capacitor, Ceramic Disc, .001 µF, 75 V	C1155
C34	Capacitor, D.M., 220 pF	C1077
C35	Capacitor, Trimmer, 15-60 pF	C1132
C36	Capacitor, Ceramic Disc, .01 µF	C0562
C37	Capacitor, D.M., 68 pF	C1140
C38	Capacitor, Ceramic Disc, .01 µF	C0562

SLN-6369A, PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

Ref.	Description	SD Part No.
C39	Capacitor, Ceramic Disc, .01 µF	C0562
C40	Capacitor, Ceramic Disc, .01 µF	C0562
C41	Capacitor, Ceramic Disc, .01 µF	C0562
C42	Capacitor, Ceramic Disc, .01 µF	C0562
C43	Capacitor, Ceramic Disc, .01 µF	C0562
C44	Capacitor, Ceramic Disc, .01 µF	C0562
C45	Capacitor, Ceramic Disc, .01 µF	C0562
C46	Capacitor, Ceramic Disc, .01 µF	C0562
C47	Capacitor, Ceramic Disc, .01 µF	C0562
C48	Capacitor, D.M., 270 pF	C1139
C49	Capacitor, D.M., 1000 pF	C1144
C50	Capacitor, Ceramic Disc, .01 µF	C0562
C51	Capacitor, Ceramic Disc, Mono, 1µF	C0879
C52	Capacitor, Ceramic Disc, .01 µF	C0562
C53	Capacitor, Ceramic Disc, .01 µF	C0562
C54	Capacitor, D.M., 270 pF	C1139
C55	Capacitor, Ceramic Disc, .01 µF	C0562
C56	Capacitor, Ceramic Disc, .01 µF	C0562
C57	Capacitor, Ceramic Disc, .01 µF	C0562
C58	Capacitor, Ceramic Disc, .01 µF	C0562
C59	Capacitor, Ceramic Disc, .01 µF	C0562
C60	Capacitor, Ceramic Disc, .01 µF	C0562
C61	Capacitor, Ceramic Disc, .01 µF	C0562
C62	Capacitor, Ceramic Disc, .01 µF	C0562
C63	Capacitor, Ceramic Disc, .01 µF	C0562
C64	Capacitor, Tant., 1 F Electro	C0524
C65	Capacitor, Ceramic Disc, .01 µF	C0562
C66	Capacitor, Ceramic Disc, Mono, .01 µF	C0881
C67	Capacitor, D.M., 33 pF	C0877
C68	Capacitor, Ceramic Disc, .01 µF	C0562
C69	Capacitor, Ceramic Disc, .01 µF	C0562
C70	Capacitor, Trimmer, 1.9-15.7 pF	C1298
C71	Capacitor, Chip, .005 µF	C1245
C72	Capacitor, Chip, .005 µF	C1245
C73	Capacitor, Trimmer, 1.3-5.4 pF	C1294
C74	Capacitor, Feed Through, 1500 pF	C6014
C75	Capacitor, Ceramic Disc, .01 µF	C0562
C76	Capacitor, Ceramic Disc, .01 µF	C0562
C77	Capacitor, Ceramic Disc, .01 µF	C0562
C78	Capacitor, Trimmer, .8-4.5 pF	03270200

SLN-6369A, PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

Ref.	Description	SD Part No.
CR1	Diode, BB105 B	CR0383
CR2	Diode, BB105 B	CR0383
CR3	Diode, BB105 B	CR0383
CR4	Diode, HPA 2800	CR0363
CR5	Diode, 1N4151	CR0150
CR6	Diode, 1N4151	CR0150
CR7	Diode, 1N4151	CR0150
CR8	Diode, 1N4151	CR0150
CR9	Diode, 1N4151	CR0150
CR10	Diode, 1N4151	CR0150
CR11	Diode, 1N4151	CR0150
CR12	Diode, 1N4151	CR0150
CR13	Diode, 1N4151	CR0150
CR14	Diode, 1N4151	CR0150
CR15	Diode, 1N4151	CR0150
CR16	Diode, HPA 2800	CR0363
CR17	Diode, HPA 2800	CR0363
CR18	Diode, Zener 1N961	CR0201
CR19	Diode, 1N4151	CR0150
CR20	Diode, 1N4151	CR0150
L1	Inductor, 5 turn X 1/8" I.D. #22 Wire	45412
L2	Inductor, 5 turn X 1/8" I.D. #22 Wire	45412
L3	Inductor, Loop, 1/2 I.D. 1/2 High	45413
L4	Inductor, 5 turn X 1/8" I.D. #22 Wire	45412
L5	Inductor, 100 µH	L0073
L6	Inductor, 10 µH	L0153
L7	Not Used	
L8	Inductor, 5 turn X 1/8" I.D. #22 Wire	45412
L9	Inductor, .33 µH	L0161
L10	Inductor, 2.7 µH	L0048
L11	Inductor, 10 µH	L0153
L12	Inductor, 1 µH Tuning	39666-2
L13	Inductor, 100 µH	L0073
L14	Inductor, 1 µH Tuning	39666-2
L15	Inductor, 100 µH	L0073
Q1	Transistor, MPS-H83	Q0314
Q2	Transistor, MPF-1000	Q0315
Q3	Transistor, MPF-1000	Q0315
Q4	Transistor, MPS-H83	Q0314
Q5	Not Used	

SLN-6369A, PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

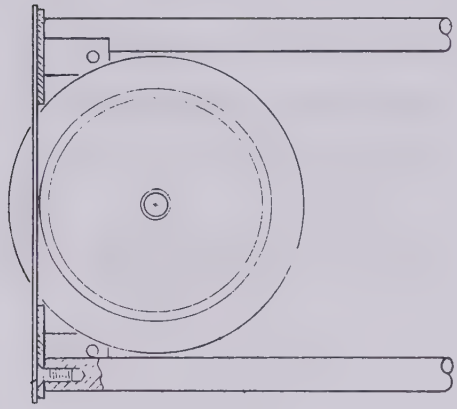
Ref.	Description	SD Part No.
Q6	Transistor, 2N3646	Q0218
Q7	Transistor, 2N3640	Q0178
Q8	Transistor, 2N3646	Q0218
Q9	Transistor, 2N3646	Q0218
Q10	Transistor, 2N3904	Q0247
Q11	Transistor, 2N3904	Q0247
Q12	Transistor, 2N3906	Q0248
R1	Not Used	
R2	Resistor, 39 k, 5%, 1/4 W, C.C.	R0748
R3	Resistor, 39 k, 5%, 1/4 W, C.C.	R0748
R4	Resistor, 22 k, 5%, 1/4 W, C.C.	R0768
R5	Resistor, 2.7 k, 5%, 1/4 W, C.C.	R0937
R6	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R7	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R8	Resistor, 91 k, 5%, 1/4 W, C.C.	R1481
R9	Resistor, 33 k, 5%, 1/4 W, C.C.	R0780
R10	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R11	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R12	Resistor, 100 k, 5%, 1/4 W, C.C.	R0741
R13	Resistor, 330 Ω, 5%, 1/4 W, C.C.	R0662
R14	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R15	Resistor, 4.7 k, 5%, 1/4 W, C.C.	R0892
R16	Resistor, 1 k, 5%, 1/4 W, C.C.	R0765
R17	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R18	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R19	Resistor, 56 Ω, 5%, 1/4 W, C.C.	R1554
R20	Resistor, 56 Ω, 5%, 1/4 W, C.C.	R1554
R21	Resistor, 4.7 k, 5%, 1/4 W, C.C.	R0892
R22	Resistor, 2.7 k, 5%, 1/4 W, C.C.	R0937
R23	Resistor, Pot., 10 k, 5%, 1/4 W, C.C.	R2383
R24	Resistor, 22 k, 5%, 1/4 W, C.C.	R0768
R25	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R26	Not Used	
R27	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R28	Resistor, 22 k, 5%, 1/4 W, C.C.	R0768
R29	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R30	Resistor, 820 Ω, 5%, 1/4 W, C.C.	R0762
R31	Resistor, 2.7 k, 5%, 1/4 W, C.C.	R0937
R32	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R33	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766

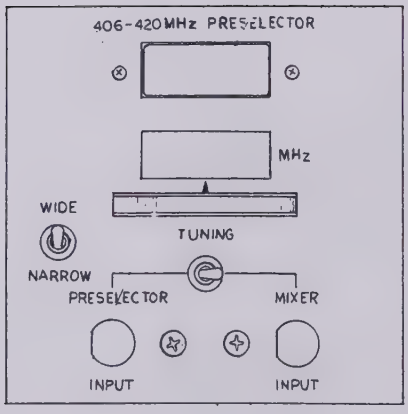
SLN-6369A, PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

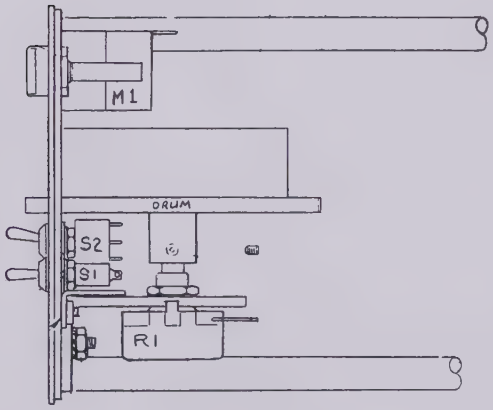
Ref.	Description	SD Part No.
R34	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R35	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R36	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R37	Resistor, 1 k, 5%, 1/4 W, C.C.	R0765
R38	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R39	Resistor, 1 k, 5%, 1/4 W, C.C.	R0765
R40	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R41	Resistor, 820 Ω, 5%, 1/4 W, C.C.	R0762
R42	Resistor, 3.3 k, 5%, 1/4 W, C.C.	R0742
R43	Resistor, 820 Ω, 5%, 1/4 W, C.C.	R0762
R44	Resistor, 33 Ω, 5%, 1/4 W, C.C.	R1550
R45	Resistor, 56 Ω, 5%, 1/4 W, C.C.	R1554
R46	Resistor, Pot., 100 Ω, 5%, 1/4 W, C.C.	R2374
R47	Resistor, 3.3 k, 5%, 1/4 W, C.C.	R0742
R48	Resistor, 560 Ω, 5%, 1/4 W, C.C.	R0819
R49	Resistor, 5.6 k, 5%, 1/4 W, C.C.	R0821
R50	Resistor, 5.6 k, 5%, 1/4 W, C.C.	R0821
R51	Resistor, 680 Ω, 5%, 1/4 W, C.C.	R1234
R52	Resistor, 1 k, 5%, 1/4 W, C.C.	R0765
R53	Resistor, 2.2 k, 5%, 1/4 W, C.C.	R0749
R54	Resistor, 1 k, 5%, 1/4 W, C.C.	R0765
R55	Resistor, 2.7 k, 5%, 1/4 W, C.C.	R0937
R56	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R57	Resistor, 3.3 k, 5%, 1/4 W, C.C.	R0742
R58	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R59	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R60	Resistor, 27 k, 5%, 1/4 W, C.C.	R0824
R61	Resistor, Pot. 50 k, 5%, 1/4 W, C.C.	R2368
R62	Resistor, 18 k, 5%, 1/4 W, C.C.	R0785
R63	Resistor, 4.7 k, 5%, 1/4 W, C.C.	R0892
R64	Resistor, 220 Ω, 5%, 1/4 W, C.C.	R0760
R65	Resistor, 27 k, 5%, 1/4 W, C.C.	R0824
R66	Resistor, 22 k, 5%, 1/4 W, C.C.	R0768
R67	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R68	Resistor, 10 k, 5%, 1/4 W, C.C.	R0766
R69	Resistor, 1 k, 5%, 1/4 W, C.C.	R0765
R70	Resistor, 1 k, 5%, 1/4 W, C.C.	R0765
R71	Resistor, 10 Ω, 5%, 1/4 W, C.C.	R0739
R72	Resistor, 820 Ω, 5%, 1/4 W, C.C.	R0762
R73	Resistor, 4.7 k, 5%, 1/4 W, C.C.	R0892

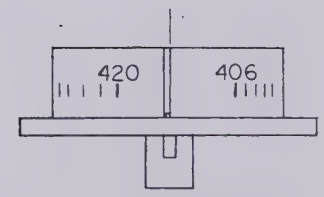
SLN-6369A, PRESELECTOR P.C. ASSEMBLY PARTS LIST (Cont'd)

Ref.	Description	SD Part No.
U1	Integrated Circuit, MC1590G	25788
U2	Integrated Circuit, LM301A	25745
Y1	Filter	Y0053





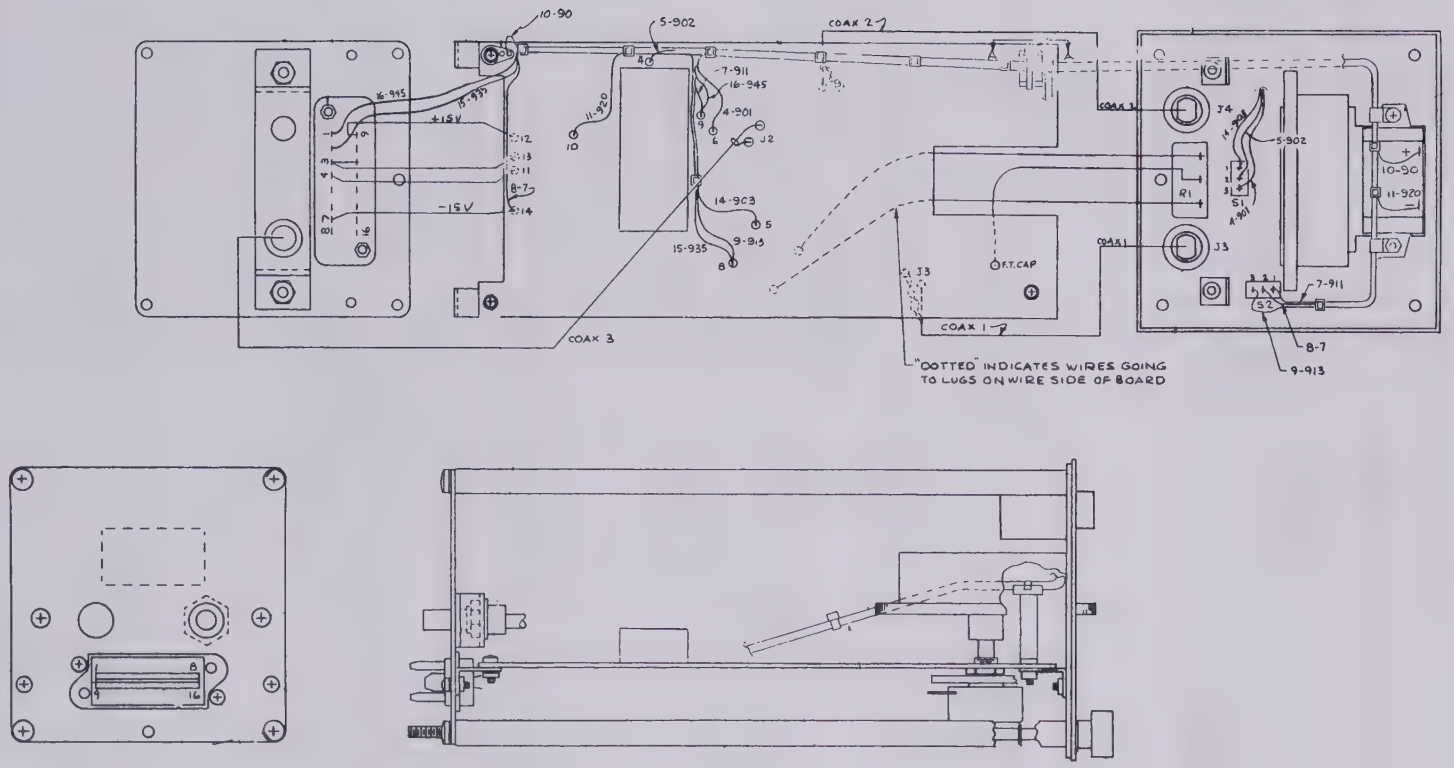




SLN-6369A, PRESELECTOR FRONT PANEL ASSEMBLY 45474

SLN-6369A, PRESELECTOR FRONT PANEL ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Preselector Front Panel Assembly	45474B
	Assembly, Tuning Drum	45404
M1	Level Meter (MRUA #TEH-15)	45302
R1	Potentiometer, 100 k, Linear Taper	R2865
S1	Switch, Toggle, Min. SPDT	S0149
S2	Switch, Toggle, Min. SPDT	S0149



SLN-6369A, PRESELECTOR FINAL ASSEMBLY 45475

SLN-6369A, PRESELECTOR FINAL ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Preselector Final Assembly	45475D
	Knob	H1959
	Rod	37340
	Connector, 16 Pin	J0613

OPTIONAL PLUG-IN
AUDIO FREQUENCY SYNTHESIZER PLUG-IN
MODEL SLN-6381A

1.1 INTRODUCTION

The Model SLN-6381A Audio Frequency Synthesizer provides low-frequency signal generation capability for the S1327B Service Monitor. The output frequency is a low-distortion sine wave whose accuracy and stability are related to the 1 MHz oscillator in the Service Monitor by a digital synthesis system.

1.2 SPECIFICATIONS

Frequency Ranges: 10.00 to 99.99 Hz (.01 Hz resolution)
100.0 to 999.9 Hz (.1 Hz resolution)
1000 to 9999 Hz (1 Hz resolution)

Accuracy: Same as reference oscillator in the S1327B main frame.

Output:

Waveform:	Sinusoidal
Distortion:	Less than 1.5%
Level:	Variable to 3 V rms into 600Ω
Duration:	Continuous or .1 to 1 second burst

Operating Temperature: -12° to +55° C

1.3 RECEIVING INSPECTION

Before accepting the instrument from the shipper, inspect the instrument's shipping container for signs of external shipping damage. Any sign of such damage must be noted by both the shipper and customer, and should be reported to the insurance investigator.

As soon as the instrument is unpacked, inspect it for shipping damage. Check for scratches or dents, broken or cracked knobs, and damaged connectors. Should any damage be found, notify your nearest Motorola representative -- do not use the instrument until instructed to do so by the representative.

1.4 INSTALLATION

The Audio Synthesizer will operate only when inserted in the lower plug-in space (synthesizer).

1.5 OPERATION

The Synthesizer is ready to use when plugged in and the main instrument power turned ON.

1.5.1 CONTINUOUS MODE

Determine the frequency desired and enter it with the thumbwheel switches on the synthesizer front panel. Note that the left-hand digit cannot be a "0" so always enter the most significant digit of the frequency to the extreme left. Next, select the RESOLUTION desired with the appropriate pushbutton switch. Each switch selects a specific frequency range so there is always four-digit resolution. Place the toggle switch in the CONTINUOUS position and adjust the LEVEL control for the desired output amplitude.

1.5.2 BURST MODE

Adjust the frequency and amplitude determining controls as in Section 1.5.1. Place the toggle switch in the OFF position and set the front panel TONE DURATION control for the burst length desired. Each time the toggle switch is depressed, a spring returns and a burst will be produced. Should it be desired to generate bursts greater than one second, simply operate the toggle switch to the CONTINUOUS position for the desired length of time, then return the toggle switch to OFF.

1.5.3 CONNECTION TO THE "EXT MOD" INPUT OF THE MODEL S1327B

When the Audio Frequency Synthesizer is used as an external modulating source for the S1327B, it is advisable to set the LEVEL control on the SLN-6381A to mid-position and use the red DEV. ADJUST control on the S1327B for adjustment of the desired modulation level. This procedure permits maximum flexibility in control of the amplitude.

1.6 CALIBRATION AND MAINTENANCE

Since the output frequency is digitally generated from the reference oscillator in the main frame, no calibration is required. There are two circuits which could require readjustment. An extender cable will be required to make these adjustments. The 10 MHz phase locked oscillator may be adjusted. First, monitor the voltage on Pin 2 of U2 with a suitable voltmeter (50,000 ohms per volt, minimum). Now adjust C5 and set the voltage to approximately 3.2 V dc.

The other circuit with adjustments is the sine wave converter. There are three adjustments in the converter circuit; R47 is the offset adjustment and provides control of the symmetry (about ground) of the triangle wave. R51 sets the triangle wave amplitude and adjusts the primary break point; control R52 adjusts the secondary break point.

Proper adjustment of the unit requires a distortion analyzer; however, if none is available, an oscilloscope may be used to

approximately set up the wave shape. Select a suitable output frequency and connect the distortion analyzer to the Synthesizer output. Carefully adjust all three of the above listed controls to achieve minimum distortion. Since this adjustment procedure will affect the output amplitude, be certain to recheck the analyzer reference level. It may be helpful to also connect the oscilloscope for coarse adjustment.

CIRCUIT DESCRIPTION
AUDIO FREQUENCY SYNTHESIZER PLUG-IN
SCHEMATIC #45442
SLN-6381A

1) GENERAL THEORY OF OPERATION

The Audio Frequency Synthesizer operates on the rate multiplier principle to produce output frequencies with accuracies related to the master reference. The rate multiplier output is processed in a digital to analog converter to provide a triangle waveform at the desired frequency. This triangle waveform is then shaped in a sine wave converter and amplified to produce the output signal. A pulse generator is provided to allow tone bursts to be produced.

2) 10 MHz LOCKED OSCILLATOR

In order to provide sufficient division of the output of the rate multiplier, it is necessary to start with 10 MHz as a reference frequency. Integrated circuit oscillator U2, divider U4 and various gates form a phase locked loop to yield a 10 MHz signal whose stability is identical to that of the reference oscillator in the main frame. The 10 MHz from oscillator U2 is divided by 10 in U4 and compared to the reference in gate U1-3. The dc control voltage resulting from any phase error present is used to control oscillator U2. The remaining gates (U1-6 and U3-3), along with diode CR7 and capacitor C39,form a detector and switch to prevent the synthesizer from operating if there is no 1 MHz reference signal present. Transistor Q1 provides shaping for the reference 1 MHz.

3) RATE MULTIPLIER

The rate multiplier consists of four integrated circuits U5 through U8. The principle involved is that of adding pulses at predetermined intervals such that the number of pulses per second equals the desired frequency. This method does not produce a train of equally spaced pulses; rather, it yields only the proper number per second.

The input frequency, and highest rate which may be produced, is 10 MHz. For example, if the most significant digit (U5) is set to a "one", it will put out one pulse for each ten input pulses or a frequency of 1 MHz. Pulses to be "added" from other digits are spaced so they will fit between each other. The rate of pulses is reduced by a factor of ten in each digit; therefore, a "one" in the second digit will cause one pulse to be added for each ten from the first digit. The resulting frequency will be 1.1 MHz.

The outputs from all four rate multipliers are summed by gates U3 to produce a single output pulse train.

4) DIVIDERS

A three-stage divider chain is used to provide frequency range switching. Integrated circuits U9 through U11 are switch selected to provide division ratios of 10, 100, and 1000.

5) TRIANGLE WAVE GENERATOR

The triangle wave generator is composed of two sections which are a reversing up-down counter and a digital-to-analog converter (DAC).

The output from the three-stage decade divider drives a two-stage up-down counter (U14 and U16). This counter is gated to count up to a count of 50, count down to zero and start up again.

The total division is 100. The accompanying timing diagram illustrates the signal relationships. Note especially the signals which are used to "flatten" out the peaks of the triangle wave. This is done to ease the requirements of the sine wave converter.

The DAC consists of inverter U19, transistors Q3 through Q12, amplifier U20 with the associated resistors and capacitors. Seven active "bits" are used to form a triangle wave (see timing diagram) from the outputs of counters U14 and U16. The inverters (U19 and Q9) are needed to provide proper signal polarity. Each inverter drives a switch transistor through an RC compensating network. The switches connect the +5 V supply through weighted resistors to the summing junction of amplifier U20,producing a waveform which varies in amplitude as the counter outputs vary. Transistors Q11 and Q12 switch a negative signal into the summing junction to "flatten" the waveforms at one peak point. The other peak is "flattened" by digitally inhibiting the ones bit. The output of amplifier U20 is a triangle wave of the desired frequency. Capacitors C23-C25 provide filtering.

6) SINE WAVE CONVERTER

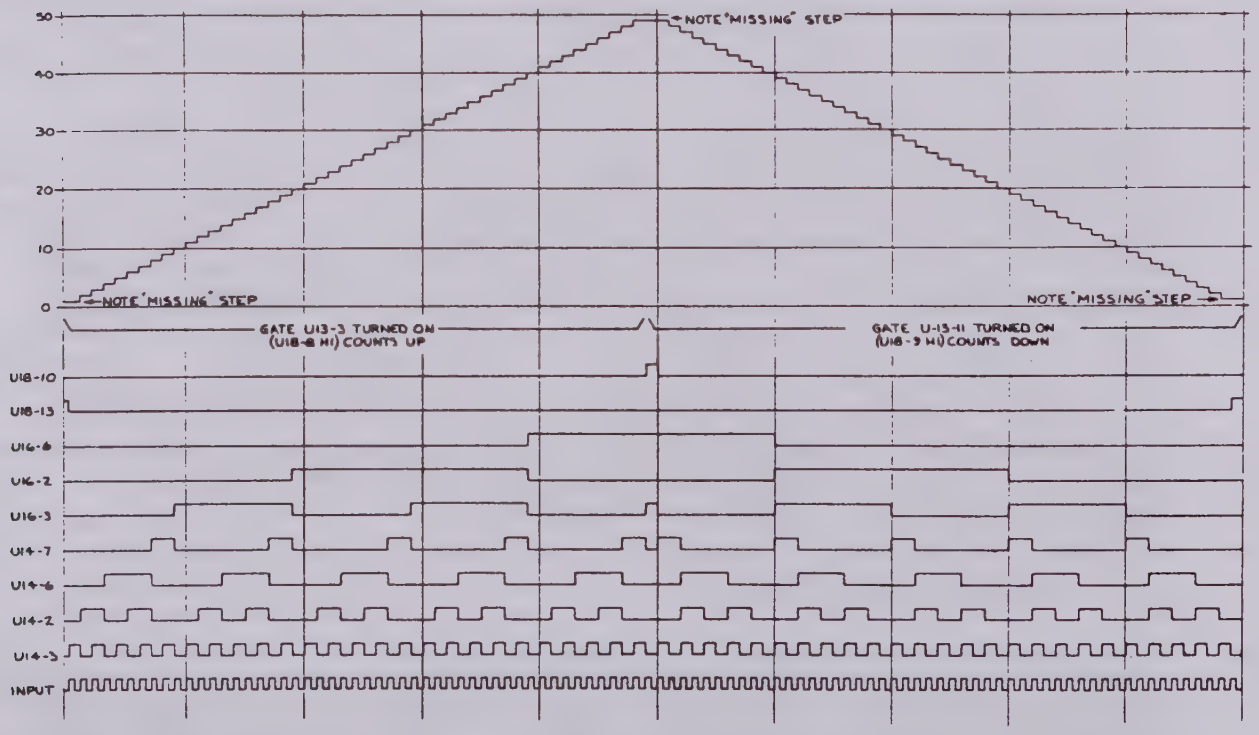
The triangle wave from U20 is fed to diodes CR1 through CR4. These diodes are used to alter the shape of the signal by attenuating it at specific amplitude. This process converts the triangle wave into a sine wave. Potentiometers R47, R51, and R52 control the symmetry, amplitude (primary break point), and secondary break point. By proper adjustment of these controls, a low-distortion sine wave results.

7) OUTPUT CIRCUIT

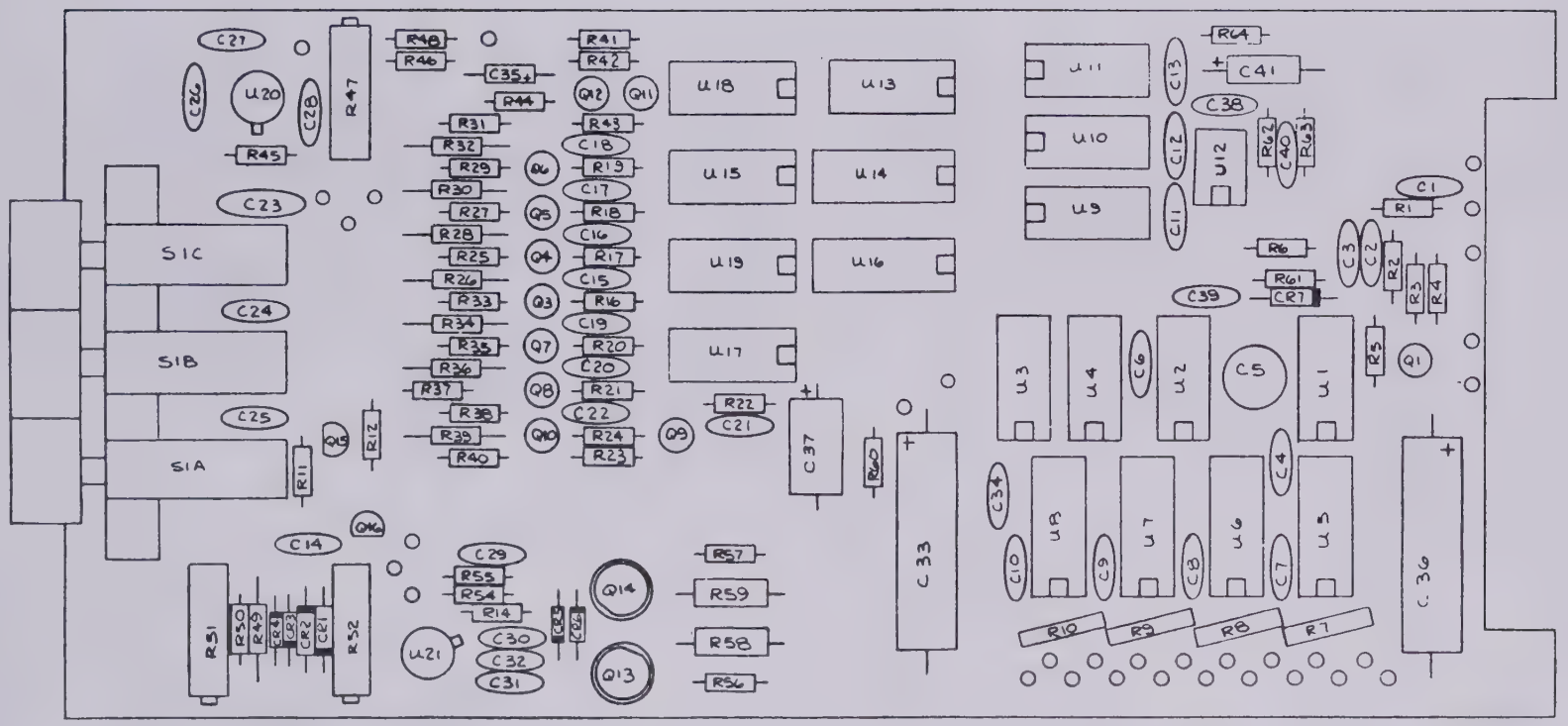
The output signal is derived from amplifier U21 and complementar, symmetry emitter followers, Q13 and Q14. Negative feedback is used to stabilize the gain and to reduce distortion.

8) TONE BURST CIRCUIT

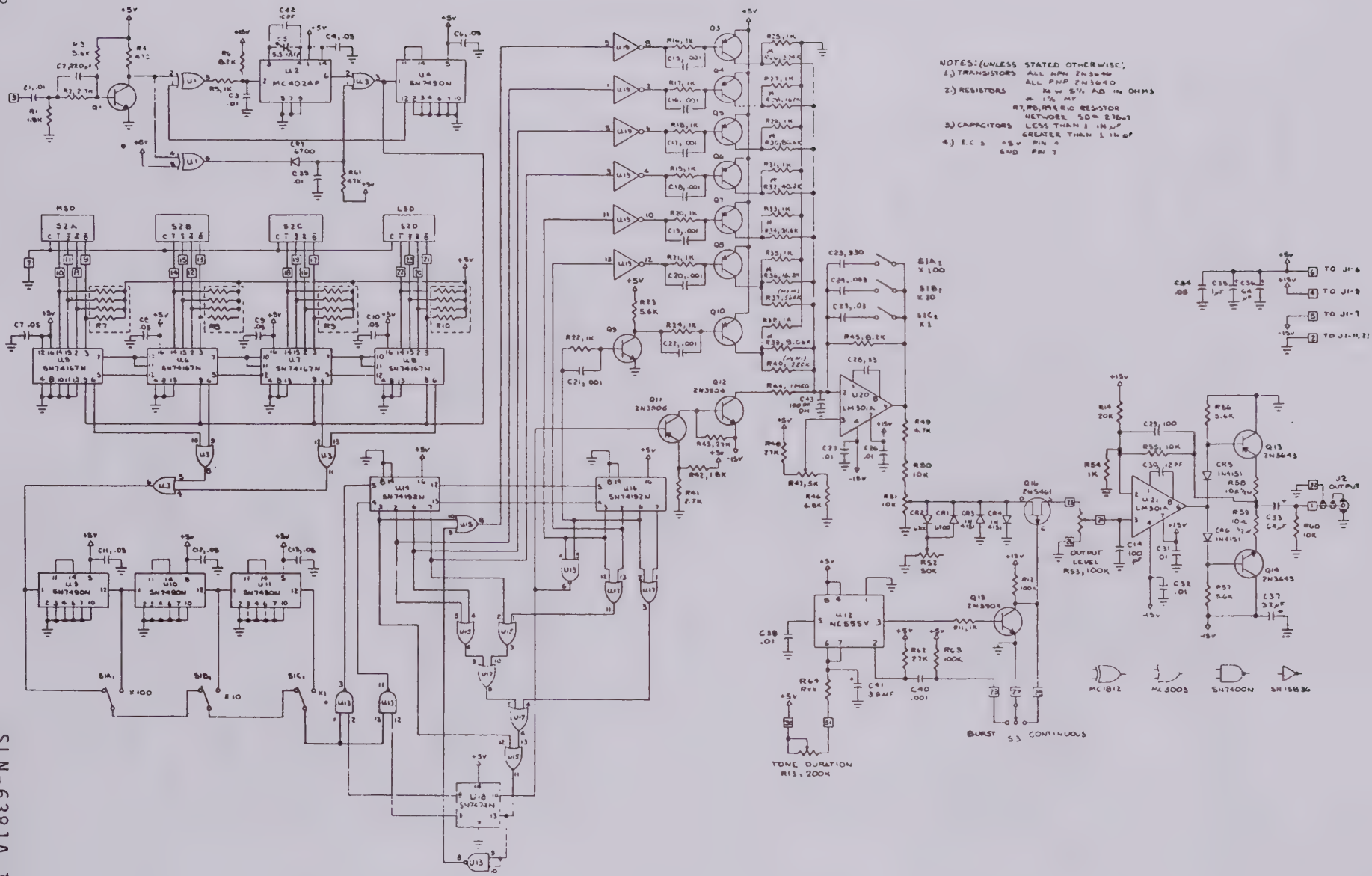
Integrated circuit U12 is used to produce a variable-width pulse for producing tone bursts. The CONTINUOUS, OFF, BURST switch controls both the initiation of a pulse from U12 and the switch Q16. With the front panel switch in CONTINUOUS, the gate of Q16 is at ground, causing it to be "ON." With the front panel switch in the OFF position, +15 volts is applied to Q16, turning it off. In the BURST position, pulse generator U12 and transistor Q15 control the voltage on Q16 gate, turning on Q16 for the duration of the pulse.



AUDIO FREQUENCY SYNTHESIZER TIMING DIAGRAM 45675A



AUDIO FREQUENCY SYNTHESIZER ASSEMBLY 45442-4-1



AUDIO FREQUENCY SYNTHESIZER SCHEMATIC 45442-7-1

SLN-6381A, AUDIO FREQUENCY SYNTHESIZER PARTS LIST

Ref.	Description	SD Part No.
	Audio Frequency Synthesizer Assembly	45442-4-1C
	Audio Frequency Synthesizer Schematic	45442-7-1A
C1	Capacitor, .01 µF, 50 V	C0562
C2	Capacitor, 100 pF	C0536
C3	Capacitor, .01 µF, 50 V	C0562
C4	Capacitor, .05 µF, 12 V	C0672
C5	Capacitor, 10-40 pF Trimmer	C0792
C6	Capacitor, .05 µF, 12 V	C0672
C7	Capacitor, .05 µF, 12 V	C0672
C8	Capacitor, .05 µF, 12 V	C0672
C9	Capacitor, .05 µF, 12 V	C0672
C10	Capacitor, .05 µF, 12 V	C0672
C11	Capacitor, .05 µF, 12 V	C0672
C12	Capacitor, .05 µF, 12 V	C0672
C13	Capacitor, .05 µF, 12 V	C0672
C14	Capacitor, 100 pF	C0536
C15	Capacitor, .001 µF, 500 V	C0424
C16	Capacitor, .001 µF, 500 V	C0424
C17	Capacitor, .001 µF, 500 V	C0424
C18	Capacitor, .001 µF, 500 V	C0424
C19	Capacitor, .001 µF, 500 V	C0424
C20	Capacitor, .001 µF, 500 V	C0424
C21	Capacitor, .001 µF, 500 V	C0424
C22	Capacitor, .001 µF, 500 V	C0424
C23	Capacitor, .03 µF	C0859
C24	Capacitor, .003 µF	C0327
C25	Capacitor, 330 pF.	C0540
C26	Capacitor, .01 µF, 50 V	C0562
C27	Capacitor, .01 µF, 50 V	C0562
C28	Capacitor, 33 pF	C0531
C29	Capacitor, 100 pF	C0536
C30	Capacitor, 33 pF	C0531
C31	Capacitor, .01 µF, 50 V	C0562
C32	Capacitor, .01 µF, 50 V	C0562
C33	Capacitor, 64 µF, 64 V	03286620
C34	Capacitor, .05 µF, 12 V	C0672
C35	Capacitor, 1 µF	C0524

Ref.	Description	SD Part No.
C36	Capacitor, 64 µF, 64 V	03286620
C37	Capacitor, 32 µF, 64 V	03290200
C38	Capacitor, .01 µF, 50 V	C0562
C39	Capacitor, .01 µF, 50 V	C0562
C40	Capacitor, .001 µF, 500 V	C0424
C41	Capacitor, 4.7 µF, 35 V	C0406
CR1	Diode, 6700	006700
CR2	Diode, 6700	006700
CR3	Diode, 1N4151	CR0150
CR4	Diode, 1N4151	CR0150
CR5	Diode, 1N4151	CR0150
CR6	Diode, 1N4151	CR0150
CR7	Diode, 6700	006700
Q1	Transistor, 2N3646	Q0218
Q2	Not used	
Q3	Transistor, 2N3640	Q0178
Q4	Transistor, 2N3640	Q0178
Q5	Transistor, 2N3640	Q0178
Q6	Transistor, 2N3640	Q0178
Q7	Transistor, 2N3640	Q0178
Q8	Transistor, 2N3640	Q0178
Q9	Transistor, 2N3646	Q0218
Q10	Transistor, 2N3640	Q0178
Q11	Transistor, 2N3640	Q0178
Q12	Transistor, 2N3646	Q0218
Q13	Transistor, 2N3643	Q0179
Q14	Transistor, 2N3645	Q0215
Q15	Transistor, 2N3904	Q0247
Q16	Transistor, 2N5461	Q0263
U1	Integrated Circuit, MC1812P	25736
U2	Integrated Circuit, MC4024P	45206
U3	Integrated Circuit, MC3003P	25762
U4	Integrated Circuit, SN7490N	25732
U5	Integrated Circuit, SN7416N	45207
U6	Integrated Circuit, SN7416N	45207
U7	Integrated Circuit, SN7416N	45207
U8	Integrated Circuit, SN7416N	45207
U9	Integrated Circuit, SN7490N	25732
U10	Integrated Circuit, SN7490N	25732

Ref.	Description	SD Part No.
U11	Integrated Circuit, SN7490N	25732
U12	Integrated Circuit, NE555V	45208
U13	Integrated Circuit, SN7400N	19705
U14	Integrated Circuit, SN74192N	25762
U15	Integrated Circuit, MC3003P	25767
U16	Integrated Circuit, SN7419N	25762
U17	Integrated Circuit, MC3003P	25767
U18	Integrated Circuit, SN7474N	25241
U19	Integrated Circuit, SN15836N	25704
U20	Integrated Circuit, LM301A	25745
R1	Resistor, 1.8k, 1/4 W, 5%	R0959
R2	Resistor, 2.7k, 1/4 W, 5%	R0937
R3	Resistor, 5.6k, 1/4 W, 5%	R0821
R4	Resistor, 470Ω, 1/4 W, 5%	R1044
R5	Resistor, 1k, 1/4 W, 5%	R0765
R6	Resistor, 8.2k, 1/4 W, 5%	R0883
R7	Resistor, Network	27867
R8	Resistor, Network	27867
R9	Resistor, Network	27867
R10	Resistor, Network	27867
R11	Resistor, 1k, 1/4 W, 5%	R0765
R12	Resistor, 100k, 1/4 W, 5%	R0741
R13	Resistor, Potentiometer, 200k	R2877
R14	Resistor, 20k, 1/4 W, 5%	R0964
R15	Not used	
R16	Resistor, 1k, 1/4 W, 5%	R0765
R17	Resistor, 1k, 1/4 W, 5%	R0765
R18	Resistor, 1k, 1/4 W, 5%	R0765
R19	Resistor, 1k, 1/4 W, 5%	R0765
R20	Resistor, 1k, 1/4 W, 5%	R0765
R21	Resistor, 1k, 1/4 W, 5%	R0765
R22	Resistor, 1k, 1/4 W, 5%	R0765
R23	Resistor, 5.6k, 1/4 W, 5%	0821
R24	Resistor, 1k, 1/4 W, 5%	R0765
R25	Resistor, 1k, 1/4 W, 5%	R0765
R26	Resistor, 324k, 1%	R2871
R27	Resistor, 1k, 1/4 W, 5%	R0765
R28	Resistor, 162k, 1%	R2870
R29	Resistor, 1k, 1/4 W, 5%	R0765
R30	Resistor, 80.6k, 1%	R2868

Ref.	Description	SD Part No.
R31	Resistor, 1k, 1/4 W, 5%	R0765
R32	Resistor, 40.2k, 1%	R2778
R33	Resistor, 1k, 1/4 W, 5%	R0765
R34	Resistor, 31.6k, 1%	R2769
R35	Resistor, 1k, 1/4 W, 5%	R0765
R36	Resistor, 16.2k, 1%	R2869
R37	Factory Select (560 k Nominal)	RXXXX
R38	Resistor, 1k, 1/4 W, 5%	R0765
R39	Resistor, 8.06k, 1%	R2872
R40	Factory Select (220 k Nominal)	RXXXX
R41	Resistor, 2.7k, 1/4 W, 5%	R0937
R42	Resistor, 1.8k, 1/4 W, 5%	R0959
R43	Resistor, 27k, 1/4 W, 5%	R0824
R44	Resistor, 1 M, 1/4 W, 5%	R0962
R45	Resistor, 8.2k, 1/4 W, 5%	R0883
R46	Resistor, 6,8k, 1/4 W, 5%	R0696
R47	Resistor, Potentiometer, 5k	01111360
R48	Resistor, 27k, 1/4 W, 5%	R0824
R49	Resistor, 4.7k, Temperature Comp.	R2589
R50	Resistor, 10k, 1/4 W, 5%	R0766
R51	Resistor, Potentiometer, 10k	01111320
R52	Resistor, Potentiometer, 50k	R2783
R53	Resistor, Potentiometer, 100k	R2866
R54	Resistor, 1k, 1/4 W, 5%	R0765
R55	Resistor, 10k, 1/4 W, 5%	R0766
R56	Resistor, 5.6k, 1/4 W, 5%	R0821
R57	Resistor, 5.6k, 1/4 W, 5%	R0821
R58	Resistor, 10Ω, 1/2 W, 5%	R1084
R59	Resistor, 10Ω, 1/2 W, 5%	R1084
R60	Resistor, 10k, 1/4 W, 5%	R0766
R61	Resistor, 47k, 1/4 W, 5%	R0777
R62	Resistor, 27k, 1/4 W, 5%	R0824
R63	Resistor, 100k, 1/4 W, 5%	R0741
R64	Factory Select	RXXXX
S1	Switch, Pushbutton	S0404
	Transistor Pad	H0515

CIRCUIT DESCRIPTION
HIGH SENSITIVITY BROADBAND MIXER PLUG-IN
MODEL SLN6396A

1) CIRCUIT DESCRIPTION

The Model SLN 6396A provides a high sensitivity, broadband measurement capability for the S1327 series service monitor. No tuning is needed. The desired receiving frequency is dialed-up on the main frame. A sensitivity control is provided to help reduce overloading. Since there is no selectivity prior to the I.F., nearby signals may cause desensitization even with the sensitivity reduced.

2) MAINTENANCE AND CALIBRATION

The mixer assembly is not field reparable and must be returned to the factory should any problems occur.

Three adjustment access holes are provided for adjusting a potentiometer, a coil, and a capacitor. Apply an appropriate input signal and monitor the 10 MHz output with an oscilloscope. Carefully adjust each component to obtain a maximum output amplitude. The input signal amplitude must be kept at a low level to prevent overload.

3) PARTS LIST

DESCRIPTION	SD PART NO.
Mixer Assembly	053608
Switch	S0149
Knob, Retaining Rod	H1959
Retaining Rod	37340
Connector, Amphenol 26-159-16	J0604
Bracket, RF Connector	39631
Connector, BNC	J0616
Connector	J0615
Potentiometer	R1860
Knob	102764

CHAPTER 7
OPTIONS

7.1 INTRODUCTION

These options provide additional flexibility for the S1327B Service Monitor and are obtainable upon request from your Motorola Representative.

7.2 OPTIONS

The options described in this Chapter include:

SLN-6364A DC Inverter Option
SLN-6379A Remote Meter Option
X-Oscillator Option

DC INVERTER OPTION
INSTALLATION AND USE
MODEL SLN-6364A

INTRODUCTION:

The Model SLN6364A D.C. Inverter Option allows full operation of the Model S1327 Service Monitor from a 12 V dc power source. Once installed, the inverter unit becomes a permanent part of the service monitor.

INSTALLATION:

To install the inverter, unplug the power cord from the service monitor and turn it upside down on a clean surface. Remove the bottom cover and set aside. Locate the two gray wires and the black cable which are held in a clamp fastened to the plug-in tray. Remove and discard the clamp, replace the screw. Now remove and discard the blank cover on the rear panel (directly behind the power transformer). Pull the two gray wires and the loop of black cable through the hole in the rear panel. Loosen the cover on the inverter.

Refer to the D.C. Inverter Assembly drawing and connect one of the gray wires to each of the two solder lugs on the transistor heatsink. Cut the black cable so the pieces are of approximately equal lengths. Carefully strip the two cable ends so about 1" of outer covering is removed. Separate the conductors; remove the shield wrap. Strip each red and black wire 1/4". Connect the red wires to lugs 7 and 8 on the switch and the black wires to lugs 10 and 11. Connect the two shield wires together, solder, and tape the ends of the cable to prevent the shield from shorting out any other lines.

Route the black wire with the ground lug on it through the rear panel. Mount the heatsink assembly to the rear panel, routing the wires back into the service monitor. Carefully replace the cover so as not to pinch any wires. Fasten the ground lug on the black wire to the plug-in tray rail with a #6 screw. There is a tapped hole in the rail near the rear panel.

OPERATION:

The D.C. Inverter is designed to operate the service monitor from a 12 V dc electrical source. To use, connect the positive side of the source to the red binding post and the negative side to the black binding post. Place the switch on the inverter in the 12 v dc position and the inverter will start. To turn off, place switch in the 115 V ac position. The instrument front panel power switch must be turned on to allow the master oscillator oven to operate.

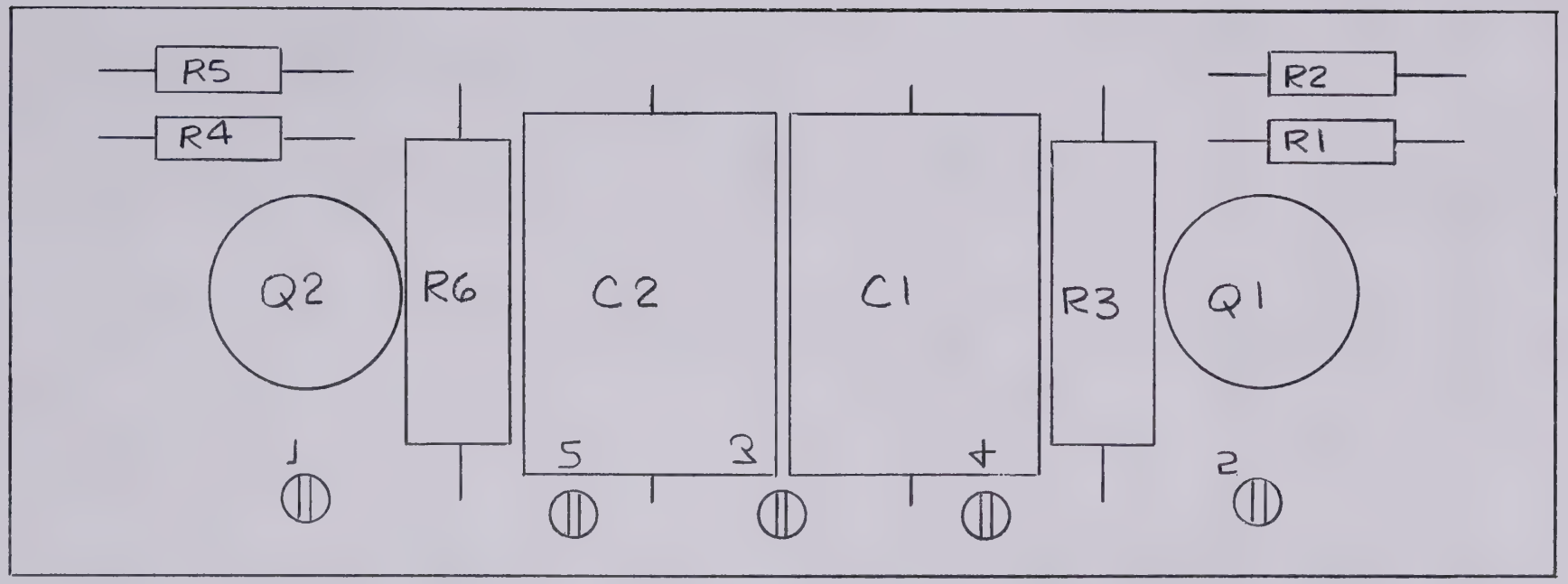
CAUTION:

Disconnect the 12 V Supply when operating the instrument from line voltage.

CIRCUIT DESCRIPTION:

The circuitry contained in the inverter assembly consists of two power transistors and two driver transistors, with their associated resistors and capacitors. A special winding in the instrument transformer is driven to produce squarewave ac at about 100 Hz. The bases of Q1 and Q2 are connected to the "opposite" driver collector through capacitors C1 and C2. This provides the required feedback to operate the circuit.

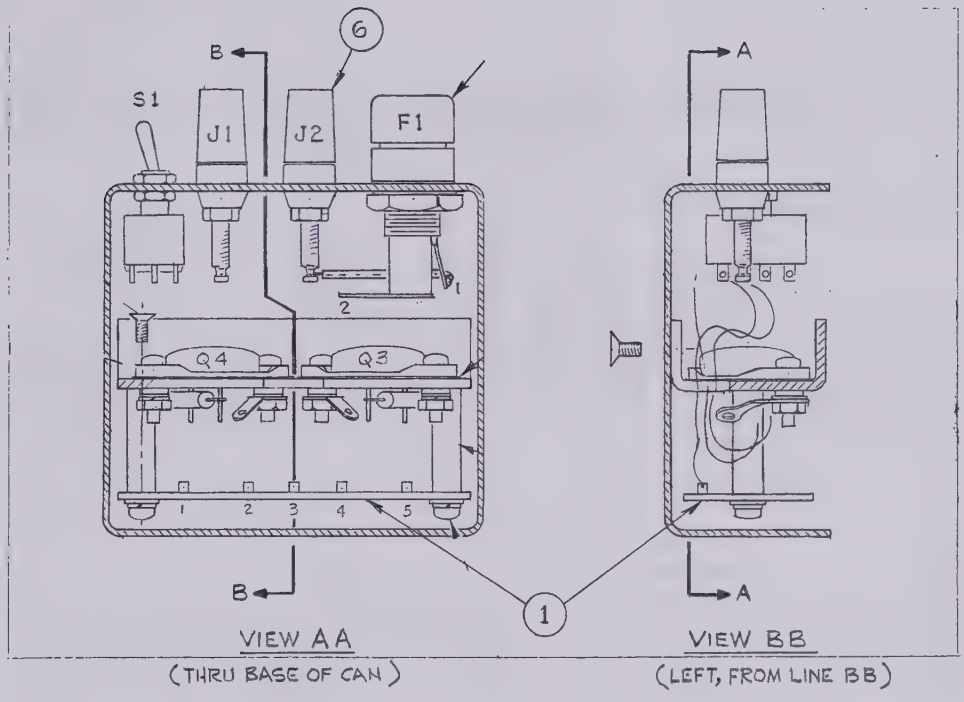
Switching is provided to disconnect both sides of the ac rear panel input connector when the inverter is in 12 V dc position. The same switch removes base drive from the power transistors when in 115 V ac position.

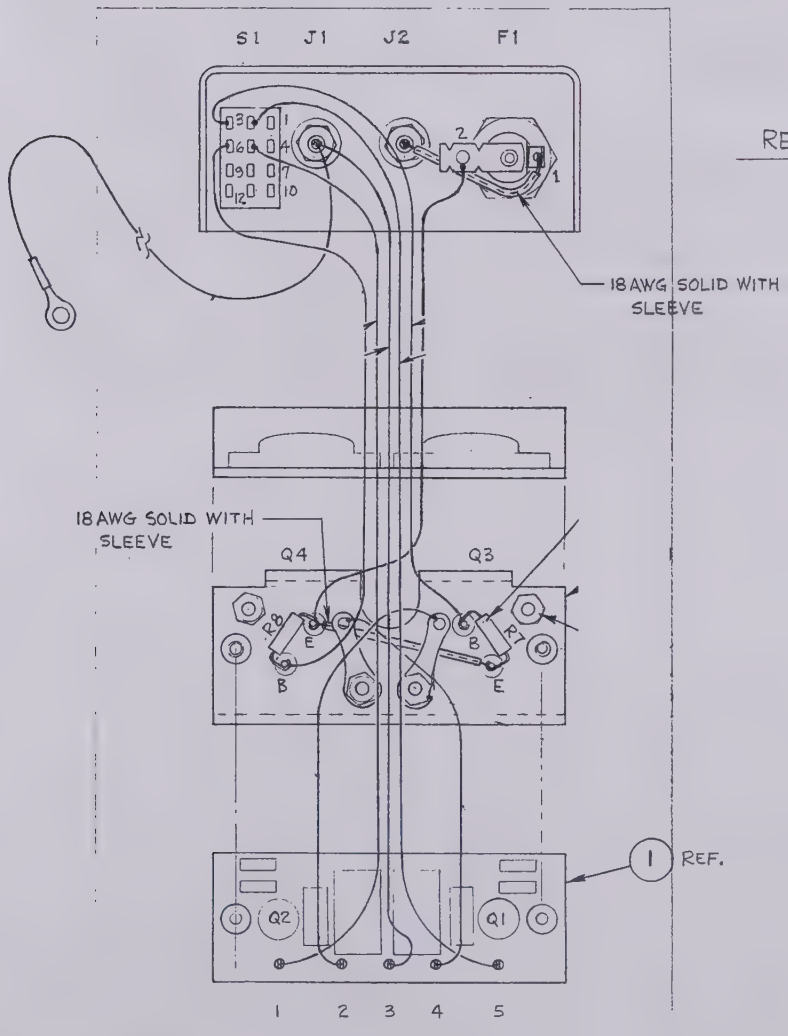


SLN-6364A, INVERTER OPTION P.C. ASSEMBLY 45034

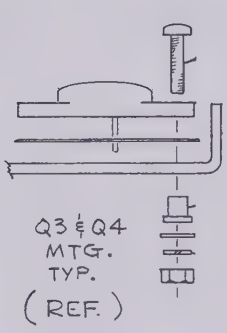
SLN-6364A, INVERTER OPTION PARTS LIST

Ref.	Description	SD Part No.
	Inverter Option P.C. Board Assembly	45034R1
	Inverter Option P.C. Board Schematic	39510R5
C1	Capacitor, 1 µF 50 V	03279390
C2	Capacitor, 1 µF 50 V	03279390
	Terminal	E0100
	Transistor Pad	H0515
Q1	Transistor, 2N3638	Q0181
Q2	Transistor, 2N3638	Q0181
R1	Resistor, 390 Ω, 1/4 W, 5%	R0880
R2	Resistor, 5.6 k 1/4 W, 5%	R0821
R3	Resistor, 68 Ω, 1 W, 5%	R1570
R4	Resistor, 390 Ω, 1/4 W, 5%	R0880
R5	Resistor, 5.6 k, 1/4 W, 5%	R0821
R6	Resistor, 68 Ω, 1 W, 5%	R1570





REF., SCHEMATIC 39510 .



SLN-6364A, INVERTER OPTION FINAL ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Inverter Option Final Assembly	45035A
	Inverter Option P.C. Assembly	45034R1
	Inverter Option Schematic	39510R5
F1	Fuse, 5 AMP, SB	F0004
J1	Binding Post, 5 way Blk	09964480
J2	Binding Post, 5 way Red	09064470
R7	Resistor, 220 Ω, 1/2 W, CC	R1231
R8	Resistor, 220 Ω, 1/2 W, CC	R1231
S1	Switch, Toggle 4PDT Min.	S0379
Q1	Not Used	
Q2	Not Used	
Q3	Transistor, 2N1164	Q0313
Q4	Transistor, 2N1164	Q0313
XF1	Fuse Holder	X0034

REMOTE METER OPTION
INSTALLATION AND USE
MODEL SLN-6379A

1.1 INTRODUCTION

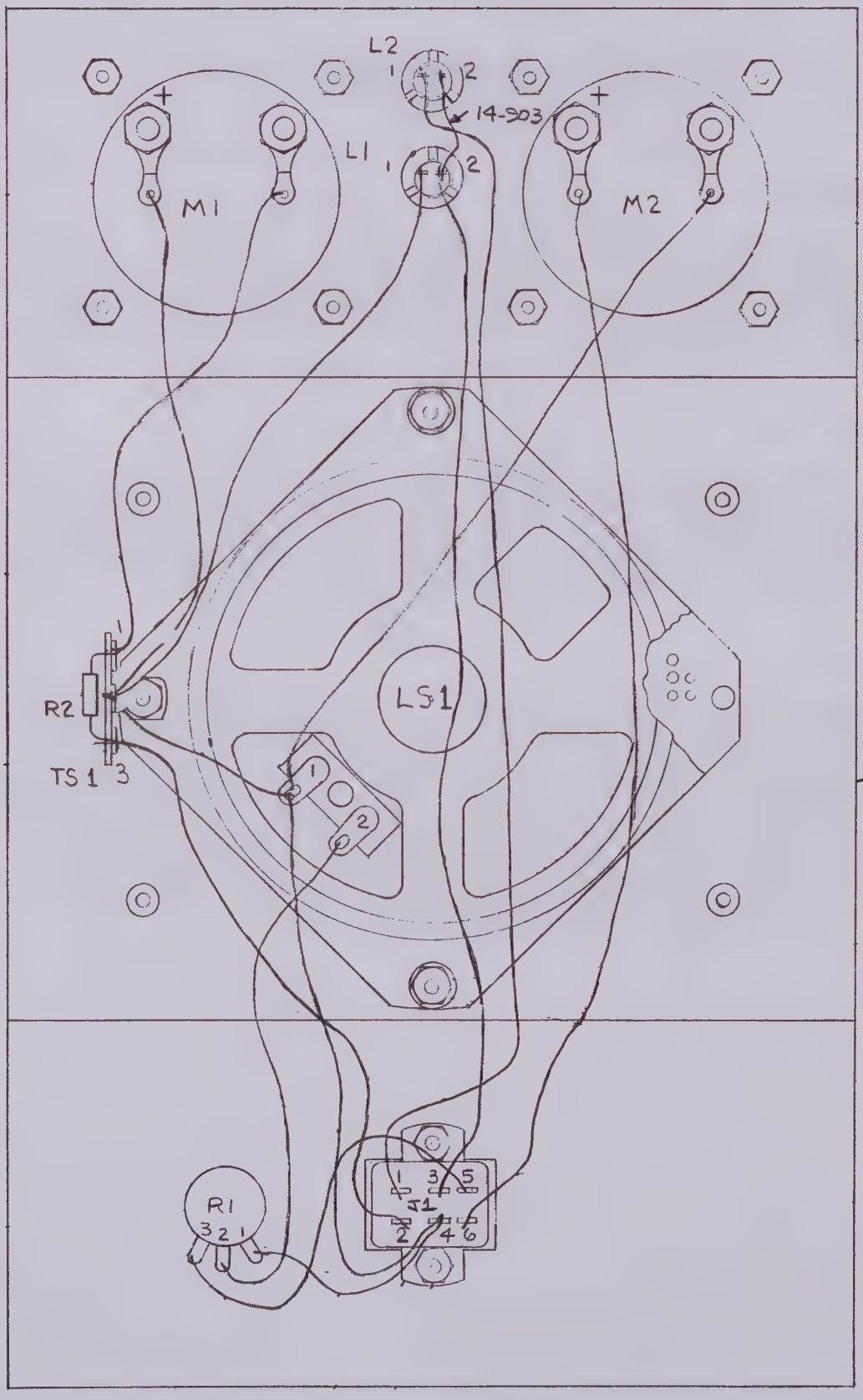
The Remote Meter Option is a set of two meters, a speaker, and two indicator lights packaged as a separate portable remote unit for the Model S1327B Service Monitor. Two Cinch Jones, male and female, cable connectors are supplied for making up the necessary mating cord for operating the remote unit.

1.2 INSTALLATION

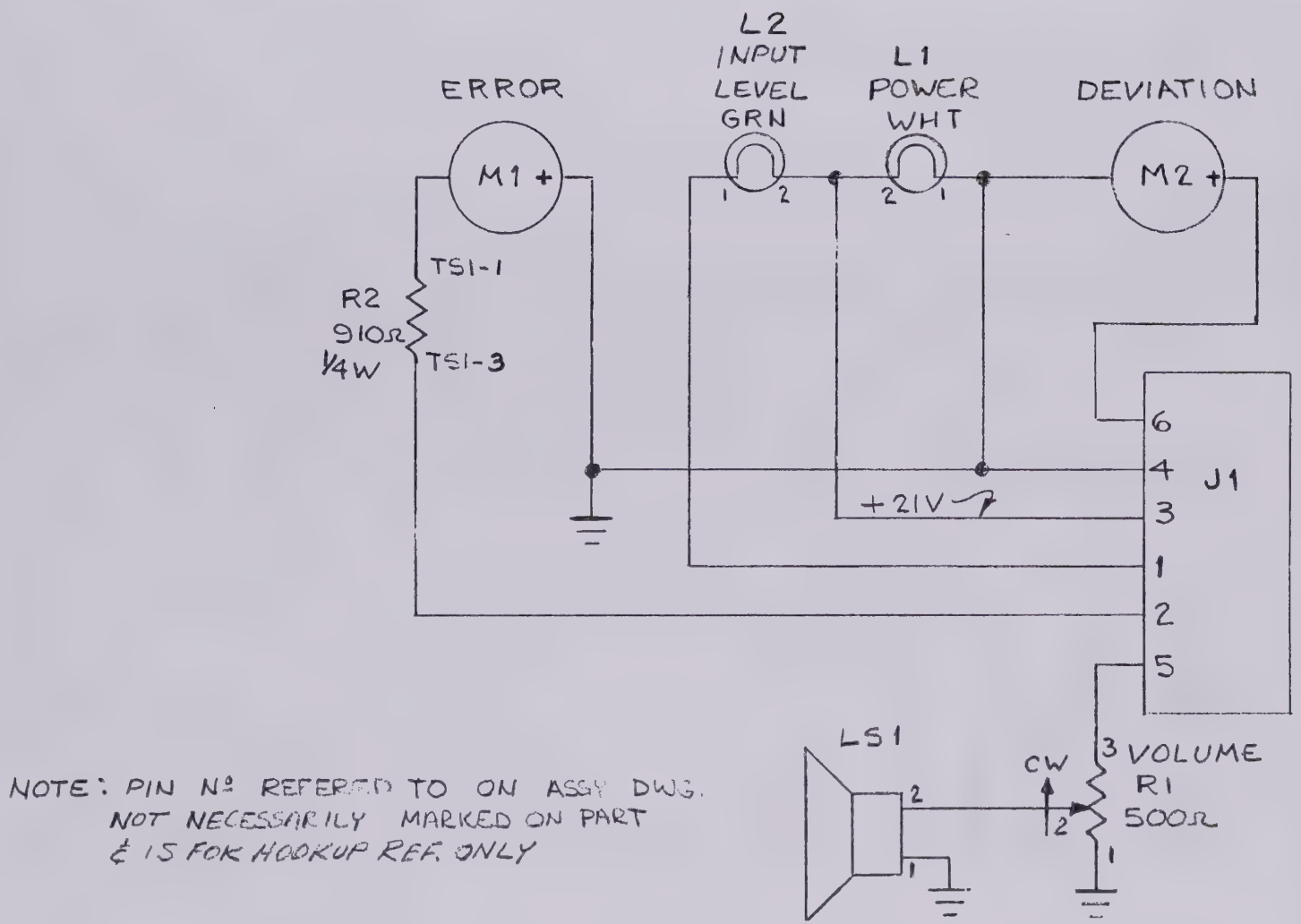
The Remote Meter unit is connected, via a 6 conductor cable, to the rear panel of the S1327B Service Monitor. There, the cable mates with the REMOTE METERS female Cinch Jones connector. The Remote Meter unit has a matching chassis-mounted male Cinch Jones connector on its rear panel. The cable may be any length.

1.3 OPERATION

When the Remote Meter unit is connected to the extension cable, the operation of the unit is automatic. The ERROR and DEVIATION meters, INPUT LEVEL (green) light, and POWER (white) light parallel the identical indicators on the front panel of the S1327B Service Monitor. Also, the speaker and volume control in the Remote Meter unit and the speaker and volume control in the S1327B Service Monitor function identically. Note that, for the DEVIATION meter to operate in the Remote Meter unit, the DEVIATION METER plug-in (SLN-6350A) must be installed in the Monitor left hand plug-in position.



SLN-6379A, REMOTE METER FINAL ASSEMBLY 45370

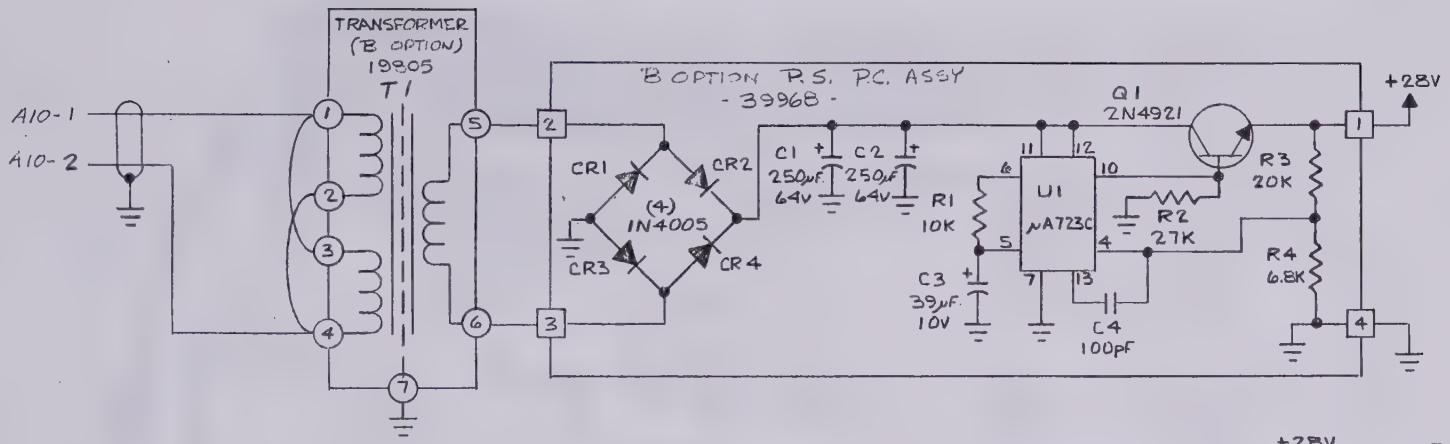


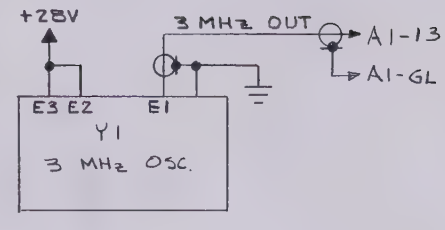
NOTE: PIN Nº REFERED TO ON ASSY DWG.
NOT NECESSARILY MARKED ON PART
& IS FOR HOOKUP REF. ONLY

SLN-6379A, REMOTE METER SCHEMATIC 45373

SLN-6379A, REMOTE METER FINAL ASSEMBLY PARTS LIST

Ref.	Description	SD Part No.
	Remote Meter Final Assembly	45370A
	Remote Meter Schematic	45373A
J1	Connector, Cinch Jones	P306AB
L1	Lamp, Wht.	10103
L2	Lamp, Grn.	10104
LS1	Speaker	LS0001
M1	Meter (Error)	M0021
M2	Meter (Deviation)	M0022
R1	Potentiometer, 500 Ω	R2709
R2	Resistor, 910 Ω, 1/4 W, 5%	R1795
TS1	Terminal Strip	H0494

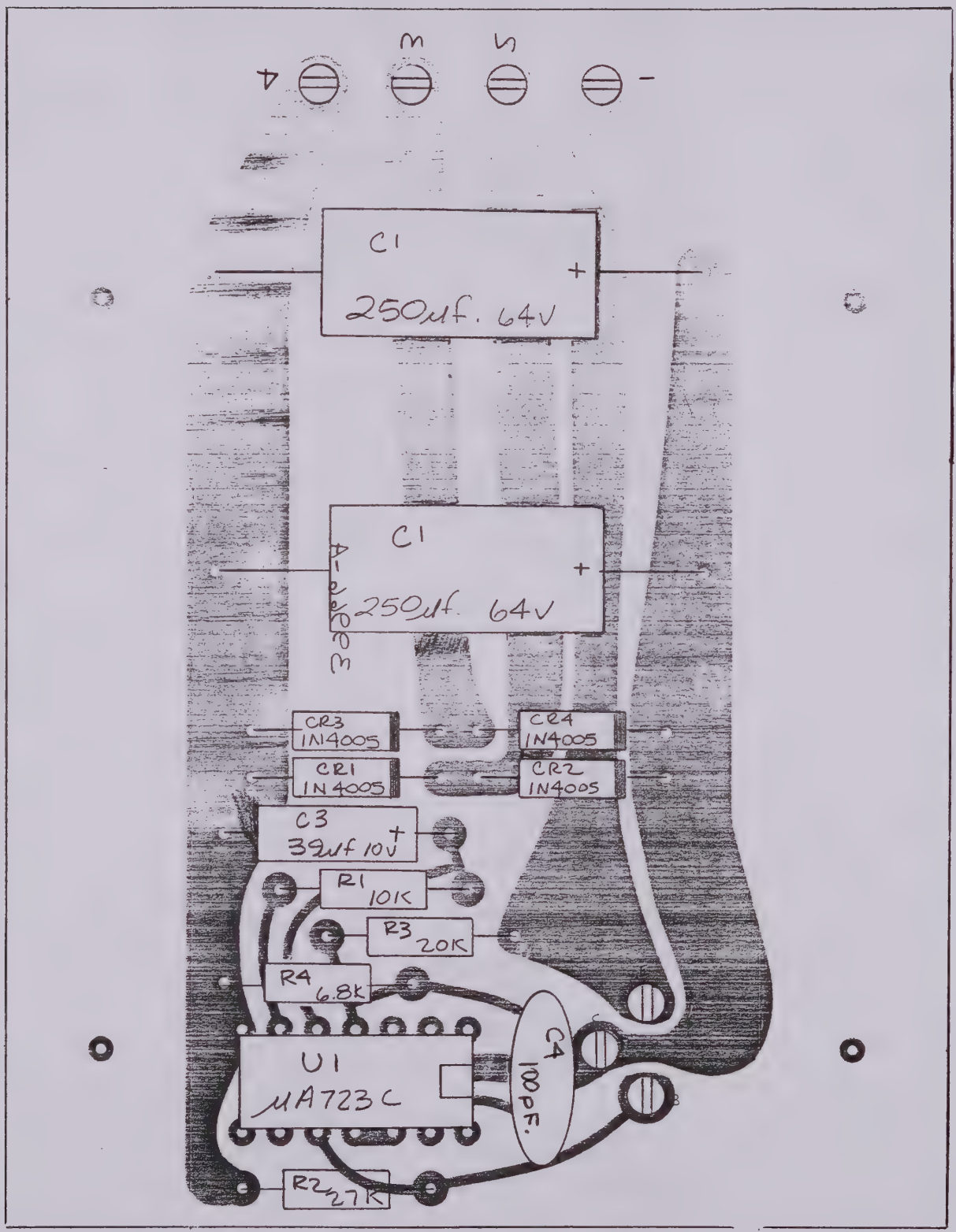




NOTES:

1. CHECK TIME BASE BOARD FOR PROPER JUMPER LOCATION
2. T1 SHOWN WIRED FOR 110V OPERATION.
   FOR 220V OPERATION REMOVE JUMPER
   AND INSTALL ONE JUMPER BETWEEN T1-2 & 3.
3. A10 XTAL OSC JUMPERS SHOULD BE INSTALLED
   IN 110V POSITION.
4. A10 IS CARRIER CARD LOCATED ON POWER TRANSFORMER
   A1 IS TIME BASE BOARD

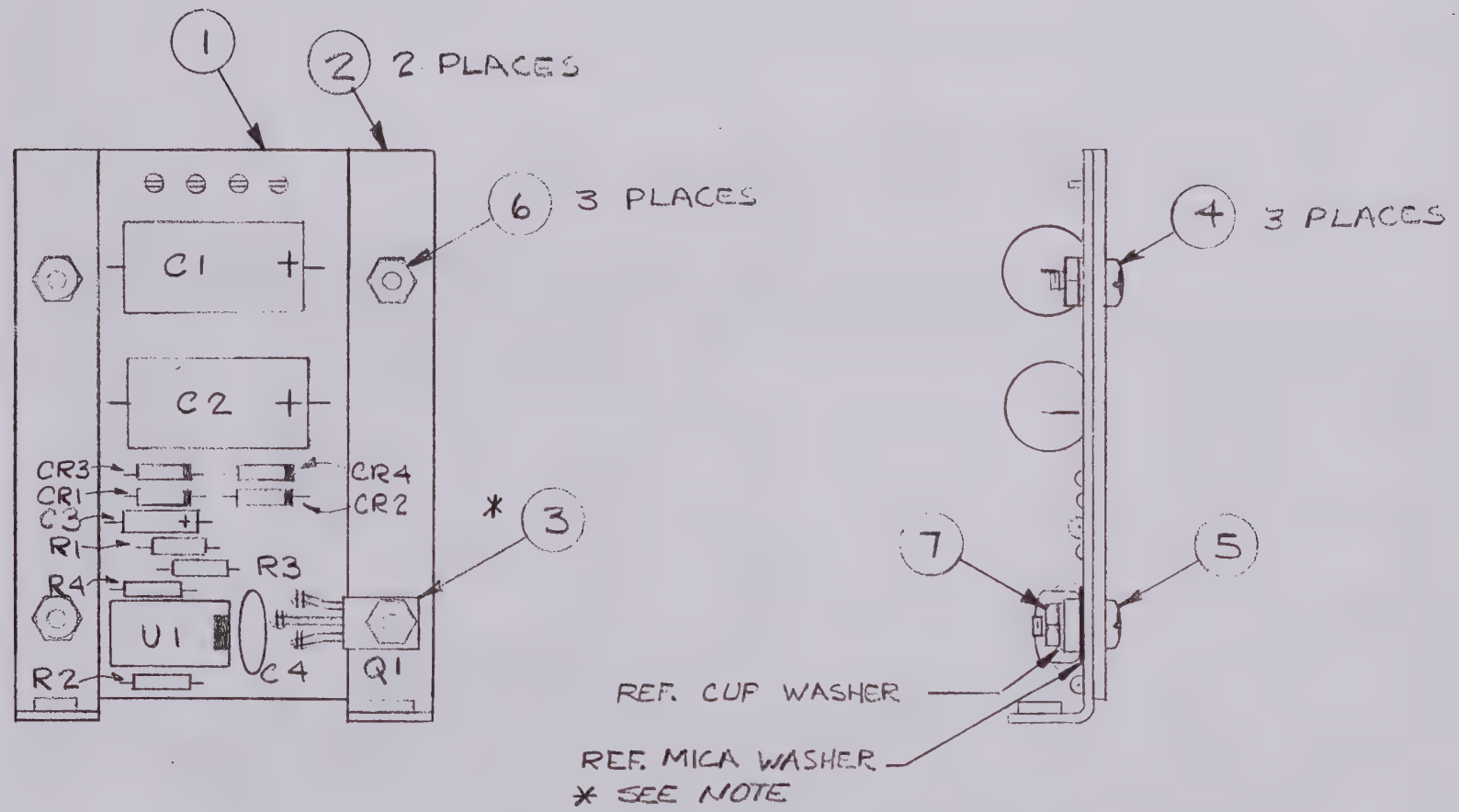
X,Y,Z OSCILLATOR OPTION, POWER SUPPLY SCHEMATIC 39965



X,Y,Z OSCILLATOR OPTION, POWER SUPPLY ASSEMBLY 39968

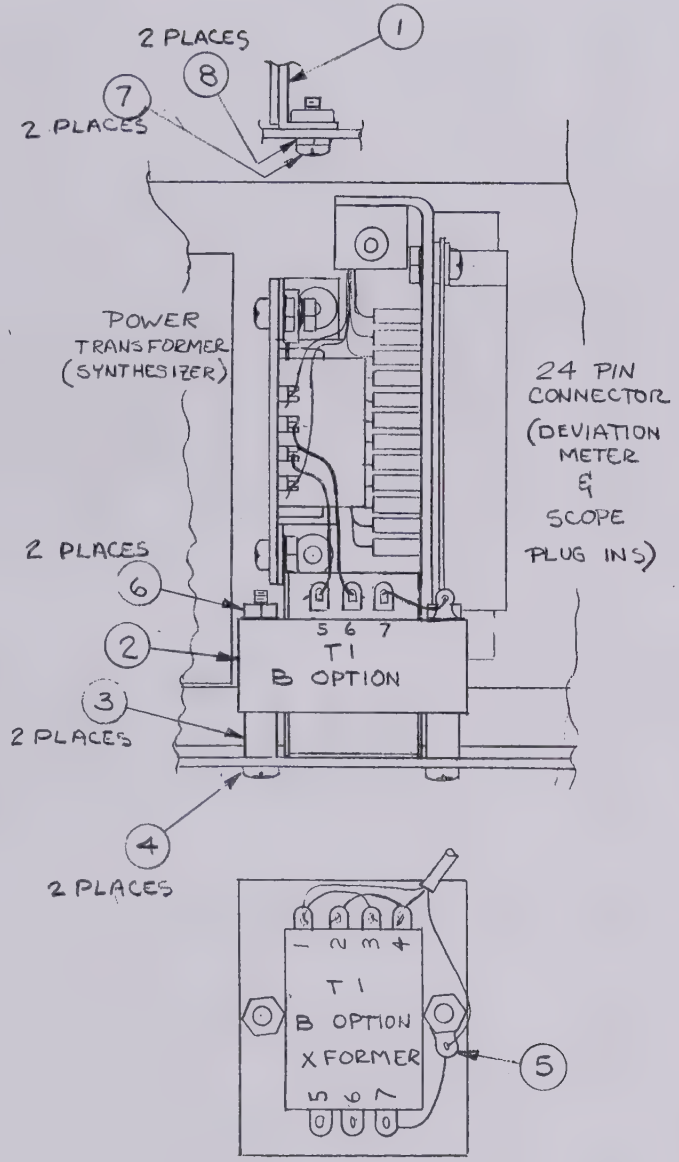
X,Y,Z OSCILLATOR OPTION PARTS LIST

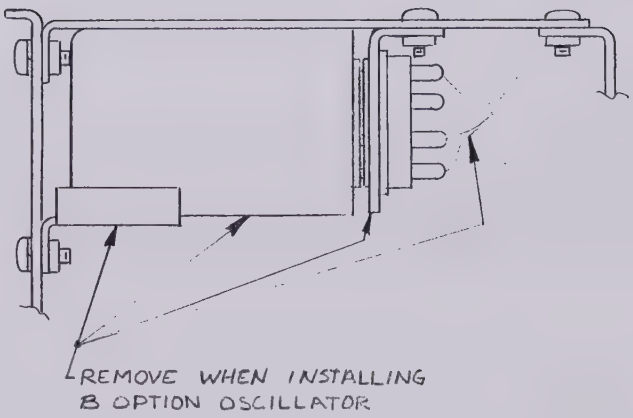
Ref.	Description	SD Part No.
SLN-6377A	Oscillator Option Power Supply P.C. Assembly	39968A
SLN-6377A	Oscillator Option Power Supply P.C. Schematic	39965A
C1	Capacitor, 250 µF, 64 V, Elect.	03286650
C2	Capacitor, 250 µF, 64 V, Elect.	03286650
C3	Capacitor, 39 µF, 100 Tant.	C0902
C4	Capacitor, 100 pF, D.M.	C0536
CR1	Diode, 1N4005	CR0284
CR2	Diode, 1N4005	CR0284
CR3	Diode, 1N4005	CR0284
CR4	Diode, 1N4005	CR0284
R1	Resistor, 10 k, 1/4 W, 5%	R0766
R2	Resistor, 27 k, 1/4 W, 5%	R0824
R3	Resistor, 20 k, 1/4 W, 5%	R0964
R4	Resistor, 6.8 k, 1/4 W, 5%	R0696
T1	Transformer	19805
U1	Integrated Circuit, µA723C	25761
Q1	Transistor, 2N4921	Q0267
Y1	Oscillator, 3 MHz	X,Y,orZ



* APPLY ITEM (8) UNDER MICA WASHER, ITEM (3) A/R BEFORE MOUNTING.

X,Y,Z OSCILLATOR OPTION, POWER SUPPLY KIT ASSEMBLY 45064





X,Y,Z OSCILLATOR OPTION FINAL KIT ASSEMBLY 39969

APPENDIX A

MOTOROLA MODEL S1327B SERVICE MONITOR REPLACEABLE PARTS LIST

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
C0261	21-84309A40	Capacitor, Disc, 2 pF, 500 V, 10%
C0314	21-84309A50	Capacitor, 1 µF, 100 V, 20%
C0325	21-82447C01	Capacitor, Disc, .005 µF, 500 V
C0353	23-8278D37	Capacitor, 10 µF, 20 V, 10%
C0382	8-863509	Capacitor, .1 µF, 200 V, 20%
C0406	23-82783B11	Capacitor, 4.7 µF, 35 V, 10%
C0422	21-180A84	Capacitor, Disc, .05 µF, 500 V, +80% -20%
C0423	21-801139	Capacitor, Disc, .01 µF, 500 V, 20%
C0424	21-84309A49	Capacitor, Disc, .001 µF, 500 V, 20%
C0524	23-82783B26	Capacitor, 1 µF, 35 V, 10%
C0527	21-859934	Capacitor, 10 pF, 500 V, 10%
C0528	21-859936	Capacitor, 15 pF, 500 V, 5%
C0529	21-84309A27	Capacitor, 22 pF, 500 V, 5%
C0530	21-847771	Capacitor, 27 pF, 500 V, 2%
C0531	21-847772	Capacitor, 33 pF, 300 V, 5%
C0533	21-868681	Capacitor, 47 pF, 500 V, 10%
C0534	21-84309A28	Capacitor, 56 pF, 500 V, 5%
C0536	21-850118	Capacitor, 100 pF, 100 V, 5%
C0537	21-840047	Capacitor, 150 pF, 500 V, 5%
C0538	21-84309A33	Capacitor, 220 pF, 500 V, 5%
C0539	21-859178	Capacitor, 270 pF, 300 V, 5%

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
C0540	21-873267	Capacitor, 330 pF, 500 V, 2%
C0542	21-82537B06	Capacitor, 470 pF, 300 V, 5%
C0543	21-84309A49	Capacitor, 1000 pF, 100 V, 5%
C0556	21-801139	Capacitor, Disc, .01 µF, 500 V, +80% -20%
C0562	21-801139	Capacitor, Disc, .01 µF, 500 V +80% -20%
C0635	21-873266	Capacitor, 68 pF, 500 V
C0638	21-865452	Capacitor, Disc, 680 pF, 500 V, 10%
C0660	23-864366	Capacitor, 100 µF, 10 V, 20%
C0661	21-82371C01	Capacitor, Cer., Disc, .1 µF
C0672	21-82372C07	Capacitor, Disc, .05 µF, 25 V
C0681	21-873269	Capacitor, 820 pF, 300 V, 2%
C0693	23-82783B32	Capacitor, 22 µF, 15 V, 10%
C0707	21-865440	Capacitor, 180 pF, 500 V, 3%
C0709	20-82399D05	Capacitor, 9 - 35 pF
C0712	20-82399D04	Capacitor, 5.5-18 pF
C0832	23-82683B04	Capacitor, 100 µF, 25 V
C0873	21-847091	Capacitor, D.M., pF, 300 V, 2%
C0874	21-850118	Capacitor, D.M., 100 pF, 300 V, 5%
C0877	21-847772	Capacitor, D.M., 33 pF, 300 V, 5%
C0879	23-8273B26	Capacitor, 1 µF, 35 F, 20%
C0881	8-864428	Capacitor, .1 µF, 50 V, 20%
C0902	23-82783B36	Capacitor, 39 µF, 10 V, 10%

MODEL S1327B REPLACEABLE PARTS LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
C1009	23-84762H04	Capacitor, Tant, 2.2 µF, 20 V
C1011	23-84762H07	Capacitor, Tant, 4.7 µF, 10 V, 5%
C1071	21-871966	Capacitor, D.M., 5 pF, 500 V, 5%
C1076	21-840047	Capacitor, D.M., 150 pF, 500 V, 5%
C1077	21-859942	Capacitor, D.M., 220 pF, 500 V, 5%
C1079	21-82633E03	Capacitor, D.M., 560 pF, 300 V, 5%
C1112	23-84206011	Capacitor, 4,600 µF, 15 V
C1122	23-84205D32	Capacitor, 1,300 µF, 12 V
C1132	20-82399D07	Capacitor, 15-60 pF
C1139, C0539	21-85939	Capacitor, D.M., 270 pF, 300 V, 5%
C1144	21-82537B16	Capacitor, D.M., 1,000 pF, 100 V, 5%
C1155	21-84205D40	Capacitor, .001 µF, 75 V, 20%
C1160	21-859934	Capacitor, D.M., 10 pF, 500 V, 5%
C1162	23-84205D33	Capacitor, 1,100 µF, 500 V, 5%
C1253	21-84205D44	Capacitor, 2,300 pF
C1254	20-84204D83	Capacitor, 1.3 - 5.4 pF
C1255	20-84204D84	Capacitor, 1.7 - 11 pF
C1274	21-868902	Capacitor, .001 µF, 3000 V
C1287	21-84205D42	Capacitor, .01 µF, 1600 V, 10%
C1300	8-84209D37	Capacitor, Poly Carb, 1 µF, 100 V, 5%
C1329	21-131732	Capacitor, Disc, .01 µF, 2 kV
CR0068	48-84302A10	Diode, 1N821
CR0150	48-84309A57	Diode, 1N4151

MODEL S1327B REPLACEABLE PARTS LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
CR0198	48-82256C15	Diode, 1N751, Zener
CR0201	48-83624E02	Diode, 1N961A
CR0229	48-82256C20	Diode, 1N971B
CR0251	48-82525G07	Diode, 1N4719
CR0284	48-83698E06	Diode, 1N4005
CR0353	48-84204D01	Diode, MV1624 / MV2103
CR0354	48-84204D02	Diode, MV1636 / MV2108
CR0356	48-84309A52	Diode, FD700
CR0359	48-84204D03	Diode, MV1648 / MV2114
CR0363	48-84309A58	Diode, HPA2800
CR0373	48-84204D04	Diode, MA47600
CR0375	48-84204D06	Diode, MV2107
E0235	9-84209D36	Test Point, Brown
E0236	9-84205D59	Test Point, Red
E0239	9-84205D60	Test Point, Green
E0241	9-84205D61	Test Point, Violet
E0284	9-84205D65	Test Point, Brown
F0019	65-890033	Fuse, 3 AG, 1.5 amperes
F0068	65-84255C40	Fuse, 1/20 ampere
H0679	36-84205D69	Knob, Round, Dial
H1104	42-84066A60	Tie, Cable
H1189	36-84205D70	Knob
H1297	36-84205D71	Knob, Control

MODEL S1327B REPLACEABLE PARTS LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
H1959	36-84205D72	Knob, 1/2"D-1/2"H-3/16" Shaft
H1979	36-84205D73	Knob With White Line
H1982	36-84205D74	Knob, Round Ring Skirt
I0088	42-84205D75	Clip, Lamp
I0100	65P84201D73	Lamp, 40 mA, 28 V, Incand
I0103	65P84204D52	Lamp, White, 40 mA, 28 V, Incand
I0104	65P84204D53	Lamp, Green, 40 mA, 28 V, Incand
J0195	9-84205D79	Connector, 22 Pin, PC
J0246	9-84205D80	Connector, 22 Pin, Dual-PC
J0260	9-84205D81	Connector, BNC, UG1094A/U
J0604	28-84205D82	Connector, 16 Pin
J0611	9-84205D83	Connector, Coaxial
J0614	28-84205D84	Connector, Coaxial, Miniature
J0615	9-84206D15	Connector, 16 Pin Female Blue Ribbon (Amphenol #26-190-16)
J0616	28-84209D32	Connector, BNC UG-909/U
J0618	9-84205D85	Connector, Coaxial, Miniature
J0619	9-898284	Connector, 6 Pin
J0620	9-84206D14	Connector, 10 Pin (2 Row)
J0633	9-855269	Connector, Coaxial, BNC
L0048	24-84204D55	Inductor, 2.7 µH
L0053	24-84204D56	Inductor, 6.8 µH
L0068	24-84204D58	Inductor, 1,000 µH
L0073	24-84309A90	Inductor, 100 µH

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
L0080	24-84204D59	Inductor, .15 µH
L0153	24-84204D61	Inductor, 10 µH
L0156	24-84209D01	Inductor, 100 µH
L0157	24-84204D62	Inductor, 470 µH
L0158	24-84209D02	Inductor, .06 µH
L0161	24-84204D53	Inductor, .33 µH
L0164	24-84209D03	Inductor, 1.5 µH
L0165	24-84204D65	Inductor, 2.7 µH
L0173	24-84204D66	Inductor, 1.2 µH
LS0001	50-84204D51	Speaker, 4x4, 45 Ω coil
Q0178	48-84309A63	Transistor, 2N3640
Q0179	48-83827D08	Transistor, 2N3643
Q0181	48-83699E61	Transistor, 2N3638
Q0215	48-84307A21	Transistor, 2N3645
Q0218	48-84305A20	Transistor, 2N3646
Q0237	48-83042H70	Transistor, 2N3565
Q0247	48-84066A57	Transistor, 2N3904
Q0248	48-83358H10	Transistor, 2N3906
Q0264	48-84204D12	Transistor, 2N5459
Q0266	48-84204D14	Transistor, 2N4870
Q0268	48-84302A70	Transistor, 2N4918
Q0269	48-84309A61	Transistor, 2N5179
Q0281	48-84204D15	Transistor, 2N5190
Q0297	48-84204D16	Transistor, MOSFET, 40673
Q0301	48-84308A43	Transistor, 2N4093, N Channel Junc.

MODEL S1327B REPLACEABLE PARTS LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
Q0311	48-84204D18	Transistor, 3N200
R0143	6-129707	Resistor, 2.7 k, 1/2 W, 5%
R0408	18-84204D85	Resistor, 100 k, Potentiometer
R0662	6-129806	Resistor, 330 Ω, 1/4 W, 5%
R0693	6-129238	Resistor, 5.1 k, 1/4 W, 5%
R0694	6-131525	Resistor, 270 Ω, 1/4 W, 5%
R0696	6-129237	Resistor, 6.8 k, 1/4 W, 5%
R0711	6-124A60	Resistor, 3 k, 1/4 W, 5%
R0728	6-129236	Resistor, 15 k, 1/4 W, 5%
R0734	6-124A56	Resistor, 2 k, 1/4 W, 5%
R0737	6-84206012	Resistor, 1300 Ω, 1/4 W, 5%
R0739	6-124A01	Resistor, 10 Ω, 1/4 W, 5%
R0741	6-124A97	Resistor, 100 k, 1/4 W, 5%
R0742	6-129981	Resistor, 3.3 k, 1/4 W, 5%
R0743	6-131274	Resistor, 47 Ω, 1/4 W, 5%
R0744	6-129709	Resistor, 470 Ω, 1/4 W, 5%
R0749	6-129804	Resistor, 2.2 k, 1/4 W, 5%
R0758	6-124B46	Resistor, 10 M, 1/4 W, 5%
R0759	6-129887	Resistor, 12 k, 1/4 W, 5%
R0760	6-131275	Resistor, 220 Ω, 1/4 W, 5%
R0762	6-129818	Resistor, 820 Ω, 1/4 W, 5%
R0765	6-129805	Resistor, 1 k, 1/4 W, 5%
R0766	6-129668	Resistor, 10 k, 1/4 W, 5%
R0768	6-129667	Resistor, 22 k, 1/4 W, 5%

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
R0777	6-131527	Resistor, 47 k, 1/4 W, 5%
R0780	6-129526	Resistor, 33 k, 1/4 W, 5%
R0783	6-129681	Resistor, 1.5 k, 1/4 W, 5%
R0784	6-124A95	Resistor, 82 k, 1/4 W, 5%
R0785	6-131526	Resistor, 18 k, 1/4 W, 5%
R0809	6-129708	Resistor, 1.2 k, 1/4 W, 5%
R0819	6-129779	Resistor, 560 Ω, 1/4 W, 5%
R0821	6-129982	Resistor, 5.6 k, 1/4 W, 5%
R0823	6-124B05	Resistor, 200 k, 1/4 W, 5%
R0824	6-129886	Resistor, 27 k, 1/4 W, 5%
R0880	6-124A39	Resistor, 390 Ω, 1/4 W, 5%
R0883	6-129983	Resistor, 8.2 k, 1/4 W, 5%
R0892	6-129669	Resistor, 4.7 k, 1/4 W, 5%
R0937	6-129707	Resistor, 2.7 k, 1/4 W, 5%
R0939	6-129819	Resistor, 3.9 k, 1/4 W, 5%
R0959	6-129820	Resistor, 1.8 k, 1/4 W, 5%
R0961	6-128683	Resistor, 150 k, 1/4 W, 5%
R0962	6-129189	Resistor, 1 M, 1/4 W, 5%
R0966	6-131524	Resistor, 100 Ω, 1/4 W, 5%
R0967	6-124B06	Resistor, 220 k, 1/4 W, 5%
R0983	6-131276	Resistor, 150 Ω, 1/4 W, 5%
R1014	6-124B29	Resistor, 2.2 M, 1/4 W, 5%
R1020	6-124B32	Resistor, 2.7 M, 1/4 W, 5%
R1043	6-131274	Resistor, 47 Ω, 1/4 W, 5%

MODEL S1327B REPLACEABLE PARTS LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
R1044	6-129709	Resistor, 470 Ω, 1/4 W, 5%
R1059	6-124A23	Resistor, 82 Ω, 1/4 W, 5%
R1060	6-129149	Resistor, 470 k, 1/4 W, 5%
R1080	6-129149	Resistor, 470 k, 1/4 W, 5%
R1089	6-84206D22	Resistor, 1 k, 1 W, 5%
R1206	6-124B38	Resistor, 4.7 M, 1/4 W, 5%
R1233	6-129431	Resistor, 180 Ω, 1/4 W, 5%
R1234	6-129984	Resistor, 680 Ω, 1/4 W, 5%
R1235	6-128684	Resistor, 56 k, 1/4 W, 5%
R1299	6-5779	Resistor, 1.2 M, 1/4 W, 5%
R1321	6-129779	Resistor, 560 Ω, 1/4 W, 5%
R1426	6-124A21	Resistor, 68 Ω, 1/4 W, 5%
R1436	6-124A09	Resistor, 22 Ω, 1/4 W, 5%
R1444	6-185A37	Resistor, 330 Ω, 1/8 W, 5%
R1461	6-124A27	Resistor, 120 Ω, 1/4 W, 5%
R1550	6-129526	Resistor, 33 Ω, 1/4 W, 5%
R1554	6-124A19	Resistor, 56 Ω, 1/4 W, 5%
R1607	6-124A05	Resistor, 15 Ω, 1/4 W, 5%
R1619	6-124B44	Resistor, 8.2 M, 1/4 W, 5%
R1622	6-131858	Resistor, 270 k, 1/4 W, 5%
R1795	6-131289	Resistor, 910 Ω, 1/4 W, 5%
R1829	6-185A15	Resistor, 39 Ω, 1/8 W, 5%
R1860	18-84204D86	Resistor, 10 k, Potentiometer, 1/4 W, 30%

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
R2073	6-83175C17	Resistor, 15 k, 1/4 W, 1%
R2153	6-124B20	Resistor, 820 k, 1/4 W, 5%
R2272	6-126A13	Resistor, 33 Ω, 1 W, 5%
R2341	6-84205D14	Resistor, 22 k, 1 W, 5%
R2363	18-84204D87	Resistor, 50 k, Potentiometer
R2374	18-84204D88	Resistor, 100 Ω, Potentiometer 1/2 W, 30%
R2375	18-84204D89	Resistor, 500 Ω, Potentiometer, 1/2 W, 30%
R2383	18-84204D90	Resistor, 10 k, Potentiometer, 1/2 W, 30%
R2407	6-10621C67	Resistor, MF, 5.62 k, 1/8 W, 1%
R2419	18-84204D91	Resistor, 20 k, Potentiometer 1/2 W, 30%
R2420	6-84205D12	Resistor, 390 k, 1/4 W, 5%
R2448	18-84204D92	Resistor, 500 Ω, Potentiometer, 1/4 W
R2548	6-124B48	Resistor, 12 M, 5%, 1/4 W
R2638	6-84205D16	Resistor, 100 k, 1%
R2648	6-84205D18	Resistor, 909 Ω, 1%
R2651	6-84205D19	Resistor, 100 Ω, 1%
R2691	6-84205D20	Resistor, 6.98 k, .5 W, 1%
R2693	6-84205D21	Resistor, 2.32 k, .5 W, 1%
R2694	6-84205D22	Resistor, 1 k, .5 W, 1%
R2696	6-84205D23	Resistor, 10 k, .5 W, 1%
R2707	18-84204D94	Resistor, 250 k, 2 W, 10%
R2708	18-84204D95	Resistor, 500 Ω, 20%

MODEL S1327B REPLACEABLE PARTS LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
R2710	18-84204D97	Resistor, 5 k, Potentiometer, 20%
R2711	18-84204D98	Resistor, 10 k, Potentiometer, 20%
R2712	18-84204D99	Resistor, 25 k, Potentiometer
R2721	18-84209D25	Resistor, 2 k, Potentiometer
R2722	18-84209D23	Resistor, 200 Ω, Potentiometer
R2738	18-84205D01	Resistor, 10 k, Potentiometer, 20%
R2787	6-84205D27	Resistor, 9.09 k, 1/8 W, 1%
R2788	6-84205D28	Resistor, 90.9 k, 1/8 W, 1%
R2789	6-84205D29	Resistor, 909 k, 1/8 W, 1%
R2790	18-84205D02	Resistor, 1 M, High Voltage
R2793	18-84205D05	Resistor, 500 Ω, Potentiometer
R2794	18-84205D06	Resistor, 2 k, Potentiometer
R2816	18-84209D24	Resistor, 1 k, Potentiometer
R2842	6-83175C27	Resistor, MF, 20 k, 1/4 W, 1%
R2881	6-10621C02	Resistor, MF, 1.18 k, 1/8 W, 1%
R2923	18-84209D22	Resistor, 20 Ω, Potentiometer
RF0015	51-84204D41	Mixer, Balanced
S0149	40-84204D69	Switch, Toggle, SPDT
S0150	40-84204D70	Switch, Toggle, SPDT
S0356	40-84204D72	Switch, Slide, SPDT
S0363	40-84209D19	Switch, Slide, 4PDT
S0410	40-84204D77	Switch, Toggle, Miniature
T0115	25-84204D47	Transformer, Power (Stancor #PS8415)

MODEL S1327B REPLACEABLE PARTS LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
V0134	D7200GH	Tube, CRT, 3 inch Rect.
W0076	30-84303A93	Cord, Power
X0004	9-84205D76	Socket, Molded, Octal
X0034	9-82083C02	Fuse Post
X0133	9-84205D77	Socket, Lamp
Y0023	1-84204D43	Oscillator, 1 MHz
Y0049	1-84204D44	Filter, 10 MHz
Z0008	1-84209D40	Filter, RFI AC Line, IEC Recept
019705	51-84309A73	Integrated Circuit, SN7400N
019706	51-84309A78	Integrated Circuit, SN7410N
019709	51-84309A72	Integrated Circuit, SN7473N
019711	51-84309A76	Integrated Circuit, SN7490N
025241	51-84309A77	Integrated Circuit, SN7474
025716	51-84306A51	Integrated Circuit, MC1013P
025718	51-84309A82	Integrated Circuit, 1023P
025719	51-84309A83	Integrated Circuit, MC1027P
025733	51-84204D25	Integrated Circuit, MC1806P
025734	51-84204D26	Integrated Circuit, MC1808P
025735	51-84204D27	Integrated Circuit, MC1810P
025738	51-84204D28	Integrated Circuit, SN7483N

MODEL S1327B REPLACEABLE PARTS LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
025739	51-84204D29	Integrated Circuit, MC3002P
025740	51-84708G05	Integrated Circuit, MC3001P
025745	51-84204D30	Integrated Circuit, LM301A
025749	51-4484D09	Integrated Circuit, SN7442N
025750	51-4485D02	Integrated Circuit, SN74H11N
025761	51-82554F38	Integrated Circuit, 723 Voltage Regulator
025763	51-84084D48	Integrated Circuit, SN74193
025765	51-84204D33	Integrated Circuit, MC1670P
025766	51-84204D31	Integrated Circuit, MC3000P
025767	51-84204D34	Integrated Circuit, MC3003P
025770	51-84204D36	Integrated Circuit, CA3076
025788	51-84204D38	Integrated Circuit, MC1590G
027867	51-84204D81	Res. Assembly Per Dwg #027867
027913	48-84209D15	Diode, 1N463, Selected
033564-4	7-84206D39	Side Edge Trim
033570-4	55-84206D34	Handle
037340	47-84206D08	Rod, Securing
039099	1-84206D41	Latch Hinge Assembly
039131	15-84206D33	Side Cover (Left and Right)
039149	15-84206D31	Top Cover
039156	25-84206D26	Transformer, Power
039158	7-84206D36	Front End Trim (Left Vertical)
039501	1-84205D89	Time Base Board Assembly

MODEL S1327B REPLACEABLE PARTS LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
039509	1-84205D91	Control Logic Board Assembly
039513	1-84205D95	Power Supply Board Assembly
039524	1-84206D04	Multiplier Board Assembly, 100 MHz
039534	7-84206D38	Front Trim (Top and Bottom Horiz.)
039584	40-84205D51	Switch Assembly, Thumbwheel
039607	1-84205D98	Input Board Assembly
039645	35-84205D52	Speaker Screen
039666-1	24-84206D16	Inductor, 3.3 µH
039666-2	24-84206D17	Inductor, 1 µH
039667-2	24-84209D04	Inductor
039667-4	24-84206D20	Inductor, Tuning
039667-5	24-84209D05	Inductor
039667-8	24-84206D19	Inductor, Tuning
039667-11	24-84206D23	Inductor, Tuning
039667-12	24-84206D24	Inductor, Tuning
039667-13	24-84206D25	Inductor, Tuning
039743	80-84209D28	Relay, Coaxial
039789	1-84206D40	Front Cover Assembly
039817	7-84206D35	Front End Trim (Right Vertical)
039823	1-84206D32	Bottom Cover Assembly
039825	1-84206D27	Heat Sink Assembly
039878	13-84205D53	Bezel
039880	61-84205D54	Graticule
039881	15-84205D55	Hood

MODEL S1327B REPLACEABLE PARTS LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
039981	40-84204D79	Switch, Sweep Range (S2)
039982	40-84204D80	Switch, Sweep Range (S4)
045052	7-84206D37	Back End Trim (Left and Right Vertical)
045054	75-84206D67	Foot, Tilt Back
045216	51-84320A58	Integrated Circuit, MC1357P
045234	51-84209D12	Integrated Circuit, SN741H120N
045237	51-84209D13	Integrated Circuit, MC4016P
045328	51-84209D11	Integrated Circuit, Sel. LM301A
045548	1-84206D06	Phase Detector Board Assembly
045745	36-84209D34	Knob, Concentric Base
045821	40-84209D20	Switch, Pushbutton
045822	40-84209D21	Switch, Pushbutton
053001	72-84209D29	Meter
053002	72-84204D49	Meter, 2BA-DUA-500-B3-KW/28
053393	1-84206D01	R.F. Final Assembly
053408	1-84209D43	Inductor, Assembly Shield Coil Form
053437	48-84209D14	Diode, Selected
053481A	1-84206D03	R.F. Out Assembly
053482	1-84209D41	Attenuator Assembly
053541	54-84209D35	Condensed Operating Instructions, Dust Cover
053608	SLN6396A	Broad Band Mixer Plug-In Assembly
102764	36-84209D33	Knob, Ring Skirt - 1/8" Shaft
102913	18-84209D27	Resistor, 50 k, Potentiometer, 20%

MODEL S1327B REPLACEABLE PART LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
0329200	23-84209D31	Capacitor, LELAX, 47 µF, 63 V
01111100	18-84205D07	Resistor, 20 k, Poetentiometer
01111310	18-84205D10	Resistor, Trimmer, 1 k, 10%
01111320	18-84209D26	Resistor, 10 k, Potentiometer
03175030	21-84209D38	Capacitor, 2 pF, Mica, 500 V
03278700	23-84205D35	Capacitor, 20 µF, 250 V
03278830	8-82995G17	Capacitor, .22 µF, 200 V
03278930	8-863508	Capacitor, .022 µF, 200 V, 10%
03279390	8-84205D50	Capacitor, 1 µF, 50 V, 20%
03279750	23-84209D30	Capacitor, 39 µF, 20 V
03281080	21-84205D43	Capacitor, .049 µF, 250 V, 10%
03281790	21-180A84	Capacitor, .05 µF, 500 V
03287360	23-84205D38	Capacitor, 8.2 µF, 15 V
03287820	23-84762H05	Capacitor, 4.7 µF, 25 V
03290200	23-84205D34	Capacitor, 32 µF, 64 V
03290240	8-82095G17	Capacitor, .22 µF, 100 V, 10%
03290290	23-84762H06	Capacitor, 1 µF, 35 V, 20%
03290790	8-84205D49	Capacitor, .0022 µF, 50 V, 10%
03966701	24-84209D06	Inductor, Adjustable
03966702	24-84209D07	Inductor, Adjustable
03966703	24-84209D08	Inductor, Adjustable
03966704	24-84209D09	Inductor, Adjustable
03966706	24-84209D10	Inductor, Adjustable
04568001	1-83554F25	Divide-By-N Assembly

MODEL S1327B REPLACEABLE PARTS LIST (Cont'd)

SD PART NO.	MOTOROLA PART NO.	DESCRIPTION
04584201	1-84206D05	H.V. Inverter Board Assembly
05034990	40-84209D39	Switch, Slide, SPDT
05322101	1-84209D42	Carrier Board Assembly
05326701	1-83554F41	Receiver Signal Processor Assembly
05327401	1-83554F42	VCO Board Assembly
05337501	1-83554F43	RF Assembly
09061440	9-84205D86	Connector, 24 Pin
09061450	28-84205D87	Connector, Blue Ribbon
09063160	28-84205D58	Test-Jack, Blue
26004011	48-84209D16	Transistor, 2N4258
26012320	48-84204D09	Diode, FD300
26013140	48-84209D17	Transistor, 2N4275
26014430	48-84209D18	Transistor, 2N4250
26015100	48-84204D21	Transistor, 2N3958
012013050	65-84204D54	Lamp, Incand, Red 507-3918-1475-600
	Pk-513	Accessories Kit
	Consisting of:	
		TEKA-24A Antenna
	1-866853	Coaxial Cable (Patching)
	1-855414	Input Extension Cable
	1-855415 Probe	Probe
	68-81069A24	Service Monitor Manual

MP MASTER
MA28393

TRUTH TABLE, A3 CONTROL LOGIC
MULTIPLIER CONTROL PORTION

GATE	U8	U8	U8	U8	U8	U8	U8	U8	U8	U9	U9	U9	U9	U9	U9	U9	U9	U9	U7	U2	U6	U6	U6	U6
PIN	1	3	8	10	11	9	6	2	15	1	2	3	4	5	6	7	9	10	11	6	8	3	6	8	11
CONN.	J	H	F	K	7																	14	M		M
	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1
	0	0	0	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	▲	1	▼
	1	0	0	0	0	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	0	1		1	
	1	0	0	0	1	0	1	0	0	1	1	0	1	1	1	1	1	1	1	1	0	0		0	
	0	1	0	0	0	0	1	0	0	1	1	1	0	1	1	1	1	1	1	1	0	1		0	
	0	1	0	0	1	1	1	0	0	1	1	1	0	1	1	1	1	1	1	1	0	0		0	
	1	1	0	0	0	1	1	0	0	1	1	1	1	0	1	1	1	1	1	1	0	1		0	
	1	1	0	0	1	0	0	1	0	1	1	1	1	1	0	1	1	1	1	1	0	0		0	
	0	0	1	0	0	0	0	1	0	1	1	1	1	1	1	0	1	1	1	1	0	0	1	0	1
	0	0	1	0	1	1	0	1	0	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0
	1	0	1	0	0	1	0	1	0	1	1	1	1	1	1	0	1	1	1	1	0	0	1	0	0
	1	0	1	0	1	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0
	0	1	1	0	0	0	1	1	0	1	1	1	1	1	1	1	0	1	1	1	0	0	1	0	1
	0	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0
	1	1	1	0	0	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0	1
	1	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0
	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	1	0
	0	0	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0
	1	0	0	1	0	1	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0	1
	1	0	0	1	1	◄				SEE NOTE 2									►	1	0	0	0	0	0

See Note 1 — See Note 1

TRUTH TABLE, A3 CONTROL LOGIC
OSCILLATOR CONTROL PORTION

10's OF MHz SW	U2	U10	U10	U10	U10	U10	U10	U10	U10	U10	U10	U10	U10	U10	U10	U2	U2	U2	U4	U4	U4	U4	U5	U5	U5	U5	U1	U1	U1	U3	U3	U7	U7
	45	15	14	13	12	1	2	3	4	5	6	7	9	10	11	3	6	11	3	6	8	11	3	6	8	11	6	8	12	8	12	11	8
	49	R	P	N	13																			18	18			16	17	15				
0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0
	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	1	0	0	–
1	0	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	0	1	1	0	0	0	1	1	0
	1	1	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	1	0	1	0	–
2	0	0	1	0	0	1	1	0	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	0	0	1	1	1	1	0
	1	0	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	1	1	1	0	–
3	0	1	1	0	0	1	1	1	0	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	0	0	1	1	1	1	0
	1	1	1	0	0	1	1	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	1	1	0	0	–
4	0	0	0	1	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0
	1	0	0	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	1	0	0	–
5	0	1	0	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	0	1	1	0	0	1	0	0	1	0	1	1	0
	1	1	0	1	0	1	1	1	1	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	0	1	0	0	1	0	–
6	0	0	1	1	0	1	1	1	1	1	1	0	1	1	1	0	0	1	1	0	1	1	1	1	1	1	0	1	0	1	1	1	0
	1	0	1	1	0	1	1	1	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	1	1	1	0	1	0	0	1	0	–
7	0	1	1	1	0	1	1	1	1	1	1	1	0	1	1	0	0	1	1	0	1	1	1	1	1	1	0	1	0	1	1	1	0
	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	1	1	1	1	1	0	1	0	0	1	0	–
8	0	0	0	0	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0
	1	0	0	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	1	0	1	0	1	0	0	–
9	0	1	0	0	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	1	0	0	1	1	0
	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	0	0	0	1	0	–

NOTES:
1. U6, pin 8 and 11 will be low under these conditions if the output of U7, pin 11 is high, indicating that the IF Mode is selected.
2. This condition is not permitted.
3. All output transistor collectors go to -15 V when preceding transistor base goes to 0 V.

FIGURE 4.1
TRUTH TABLE, A3 CONTROL LOGIC

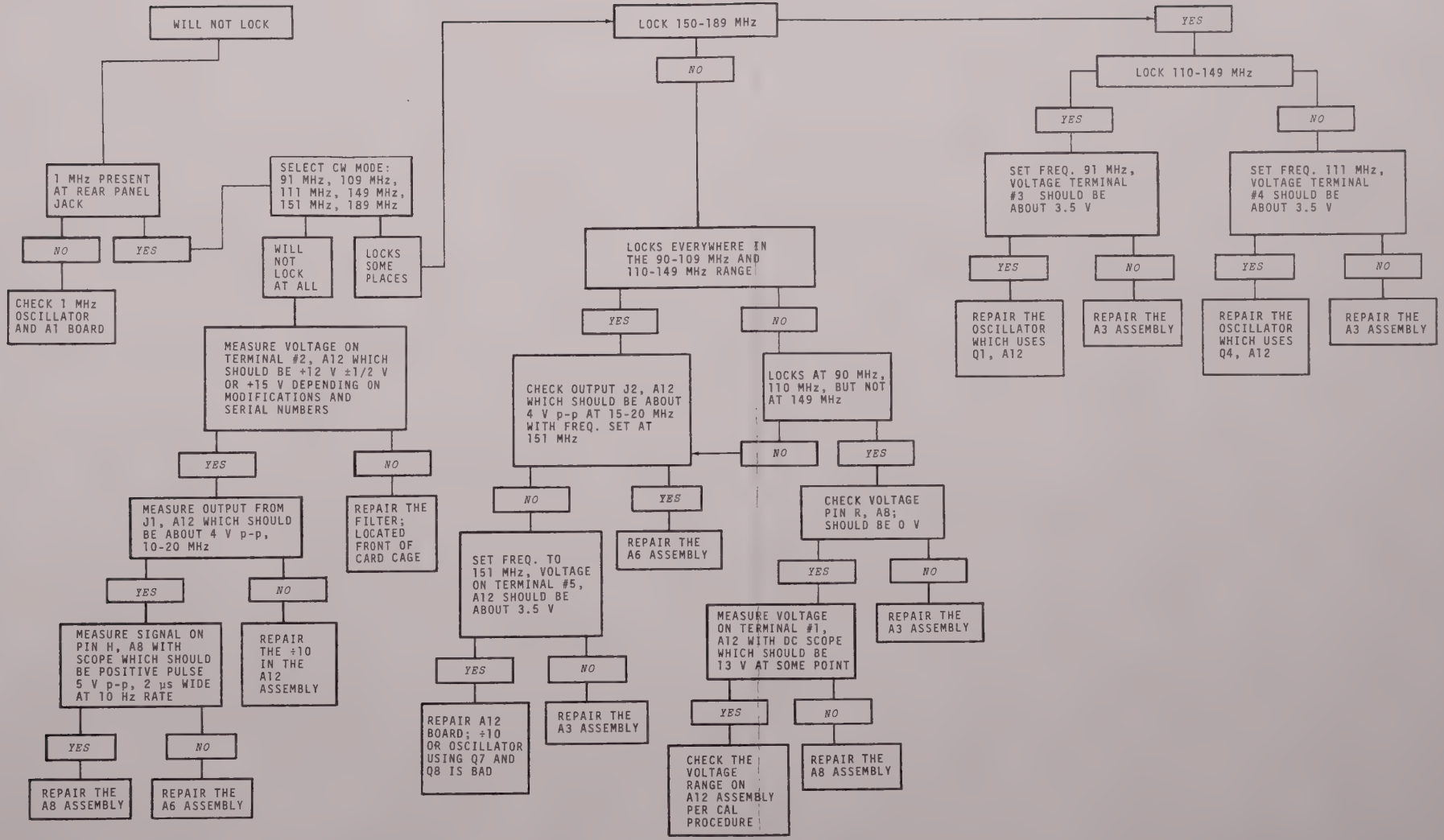
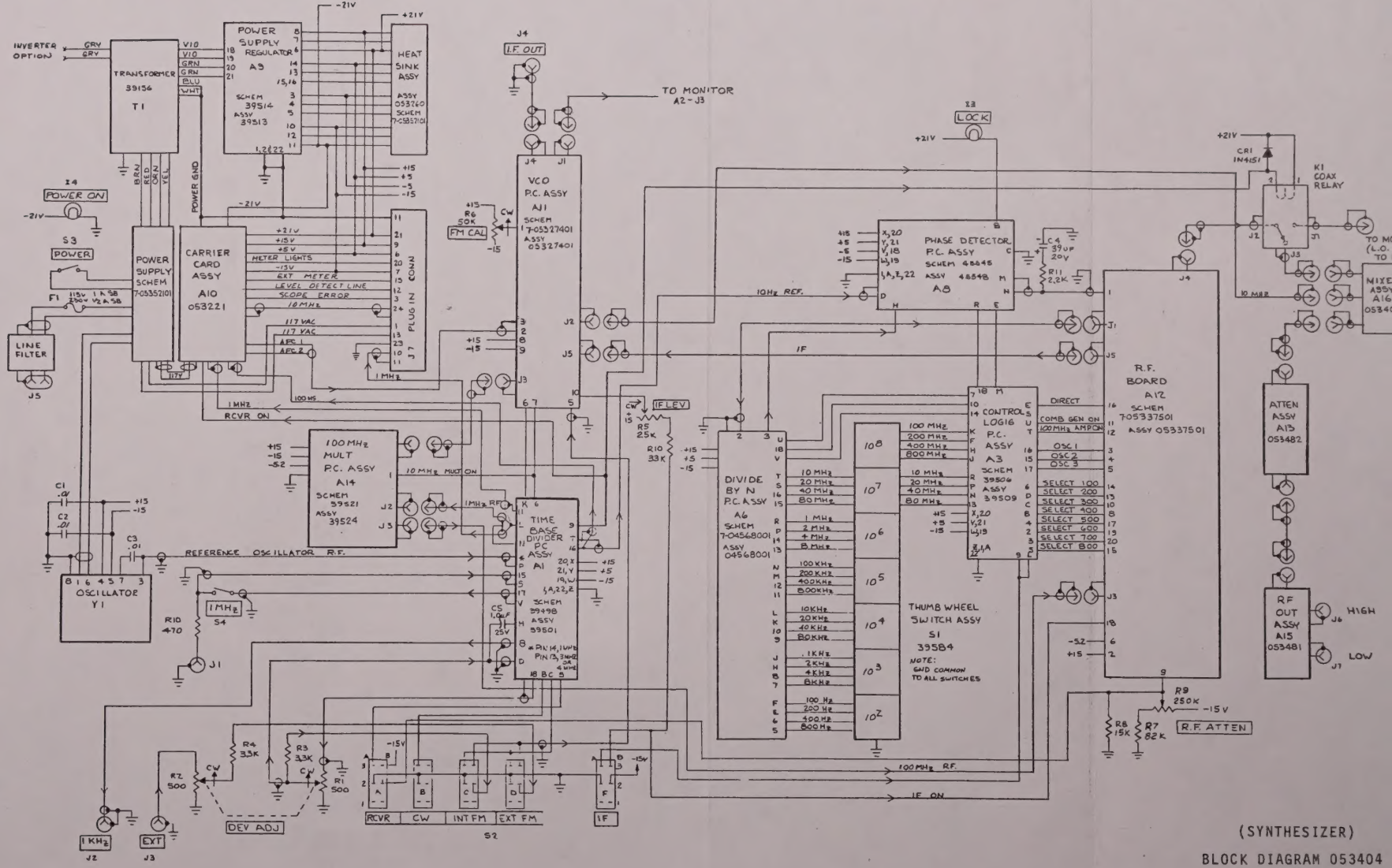
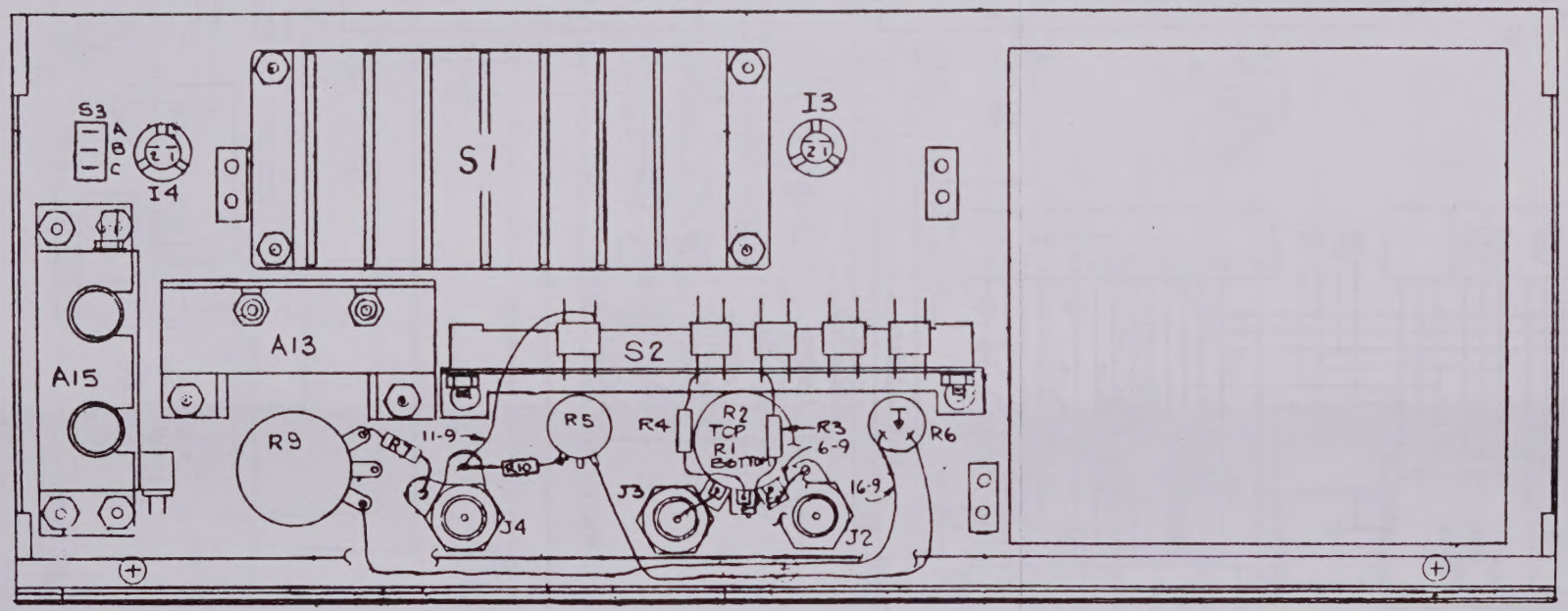

WILL NOT LOCK
1 MHz PRESENT AT REAR PANEL JACK
NO
YES
CHECK 1 MHz OSCILLATOR AND A1 BOARD
SELECT CW MODE: 91 MHz, 109 MHz, 111 MHz, 149 MHz, 151 MHz, 189 MHz
WILL NOT LOCK AT ALL
LOCKS SOME PLACES
MEASURE VOLTAGE ON TERMINAL #2, A12 WHICH SHOULD BE +12 V ±1/2 V OR +15 V DEPENDING ON MODIFICATIONS AND SERIAL NUMBERS
YES
NO
REPAIR THE FILTER; LOCATED FRONT OF CARD CAGE
MEASURE OUTPUT FROM J1, A12 WHICH SHOULD BE ABOUT 4 V p-p, 10-20 MHz
YES
NO
REPAIR THE ÷10 IN THE A12 ASSEMBLY
MEASURE SIGNAL ON PIN H, A8 WITH SCOPE WHICH SHOULD BE POSITIVE PULSE 5 V p-p, 2 µs WIDE AT 10 Hz RATE
YES
NO
REPAIR THE A8 ASSEMBLY
REPAIR THE A6 ASSEMBLY
LOCK 150-189 MHz
NO
YES
LOCK 110-149 MHz
YES
NO
SET FREQ. 91 MHz, VOLTAGE TERMINAL #3 SHOULD BE ABOUT 3.5 V
SET FREQ. 111 MHz, VOLTAGE TERMINAL #4 SHOULD BE ABOUT 3.5 V
YES
NO
YES
NO
REPAIR THE OSCILLATOR WHICH USES Q1, A12
REPAIR THE A3 ASSEMBLY
REPAIR THE OSCILLATOR WHICH USES Q4, A12
REPAIR THE A3 ASSEMBLY
LOCKS EVERYWHERE IN THE 90-109 MHz AND 110-149 MHz RANGE
YES
NO
CHECK OUTPUT J2, A12 WHICH SHOULD BE ABOUT 4 V p-p AT 15-20 MHz WITH FREQ. SET AT 151 MHz
LOCKS AT 90 MHz, 110 MHz, BUT NOT AT 149 MHz
NO
YES
NO
YES
SET FREQ. TO 151 MHz, VOLTAGE ON TERMINAL #5, A12 SHOULD BE ABOUT 3.5 V
REPAIR THE A6 ASSEMBLY
CHECK VOLTAGE PIN R, A8; SHOULD BE 0 V
YES
NO
YES
NO
REPAIR A12 BOARD; ÷10 OR OSCILLATOR USING Q7 AND Q8 IS BAD
REPAIR THE A3 ASSEMBLY
MEASURE VOLTAGE ON TERMINAL #1, A12 WITH DC SCOPE WHICH SHOULD BE 13 V AT SOME POINT
REPAIR THE A3 ASSEMBLY
YES
NO
CHECK THE VOLTAGE RANGE ON A12 ASSEMBLY PER CAL PROCEDURE
REPAIR THE A8 ASSEMBLY

FIGURE 4.2

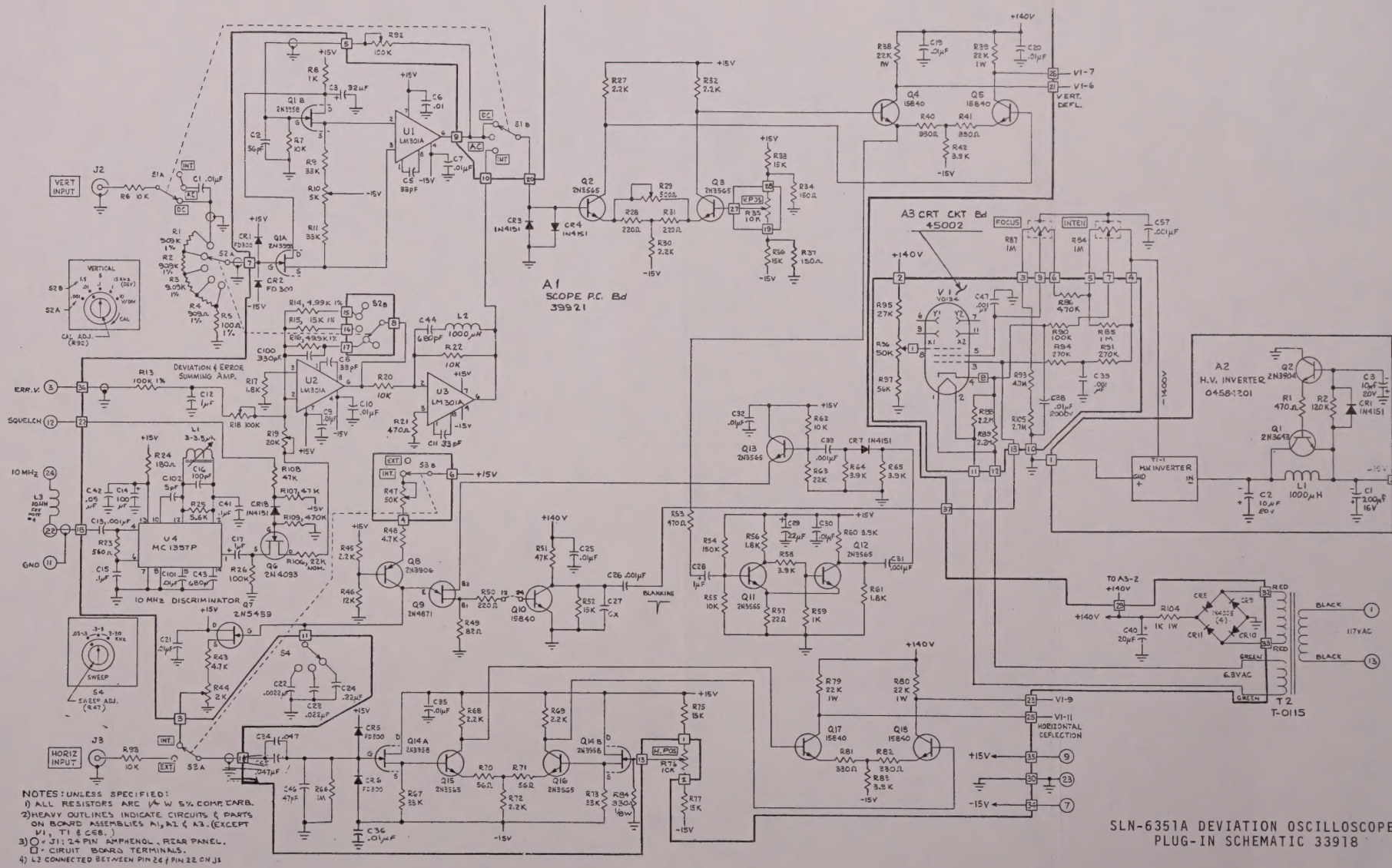
LOCK LOOP TROUBLESHOOTING TREE



SYNTHESIZER-1-74



(SYNTHESIZER), FRONT PANEL SUBASSEMBLY 053539A



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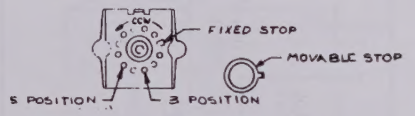
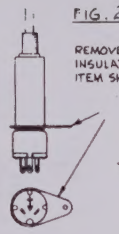
PLUG-IN SCHEMATIC 33918

FIG 1
SWITCH STOP SETTINGS



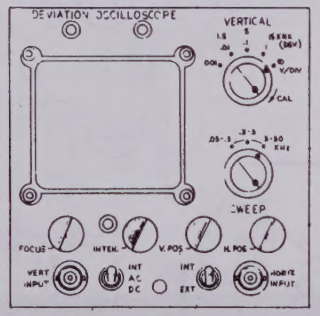
1) REMOVE MOVABLE STOP
2) ROTATE SWITCH SHAFT EXTREME CCW
3) INSTALL MOVABLE STOP AS SHOWN FOR SWITCHES S2 & S4, HOLD IN PLACE AND MOUNT EA. SWITCH IN POSITIONS SHOWN.

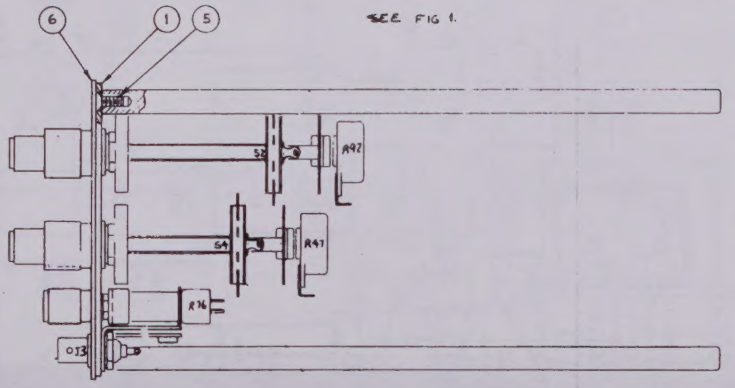
FIG. 2

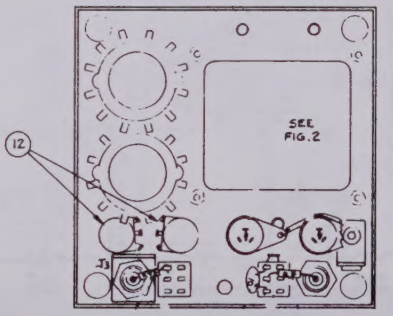


REMOVE POT FROM INSULATOR, INSTALL ITEM SHOWN WITH POT. LUGS POSITIONED AS SHOWN

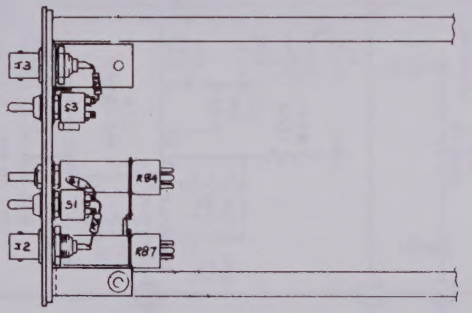
TYP. 2 EACH

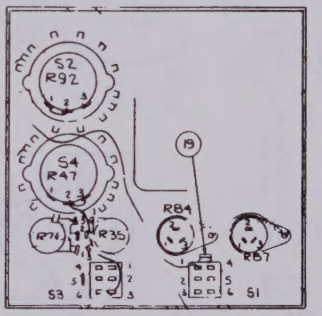






S3 S1





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